Severe Local Wind Storms and their effect on residential Mosman Park

by Mal Cronstedt,
Operations Services Officer, Fire Services,
Fire & Emergency Services Authority
of WA (FESA) Perth

Introduction

This paper will analyse the historical and possible impact of ***Severe Local Wind Storms*** (SLWS) on the Local Government area of Mosman Park**.**

It will describe the characteristics of SLWS, their historical and possible effects on the people, places and infrastructure of Mosman Park. It will also incorporate some relevant risk assessment and evaluation tools and outcomes for discussion. Some suggestions as to treatments will also be posited.

The process and steps advised by Risk Management Standard AS/NZS 4360:1995 (as adapted for emergency management) will be followed. A basic knowledge of the Standard is assumed.

Context

The study area is within the Local Government of Mosman Park and immediate environs (***Figure 1***). The Local Government (LG) is the prime agency responsible for delivering basic urban services that affect the community's viability such as rubbish collection, building approval and community services. It also deals with local planning matters.

The area is covered by the Metropolitan Emergency Management Plan, which predominantly deals with emergency response arrangements and structures. All emergency and support services are within a few kilometres of the area, though the State Emergency Service, which is the designated Hazard Management Agency (HMA) for storm damage, is located some 10 kilometres away. HMAs are designated within State Emergency Management Advisory Committee (SEMAC) Policy Statement Number 7 (PS7), which also details the State's emergency management arrangements.

Identification (of risks)

The following section outlines the first stage of the risk management process. This stage provides the opportunity to identify ***what*** might happen and ***how*** it might happen. The author has used terms adapted by emergency managers for the same stage by substituting the 'what' with Sources of Risk and 'how' with Elements at Risk.

Source of risk

The Source of Risk identified is 'Severe Local Wind Storms'. SLWS have been variously termed '…willy-willys, whirlwinds, cock eyed bobs, cyclones, freak wind gusts, wind blasts, tornadoes, tornadic squalls or simply squalls…' (Foley et al 1989, p3). There were 51 recorded SLWS events during the period 1958-1988 that caused significant property loss (Foley et al 1989, p3) in Western Australia.

Table 1 lists SLWS events that have affected the study area to date.

Foley & Hanstrum (1989) suggest that, based on historical data, the frequency of SLWS is about 1.6 per annum. Most SLWS occur along the coast between the Perth metropolitan area and Busselton some 250 km South. They are most common in June and can occur at anytime of the day.

SLWS events have been estimated to travel at speeds up to about 80 kilometres per hour and their effects are generally confined to a path some 100-300 metres wide and sometimes several kilometres in length.

Elements at Risk

The elements at risk include structures and their components, the occupants of residences and above-ground utilities (such as power and occasionally telephone).

Mosman Park is an urban coastal Local Government (LG) 14 Kilometres West of Perth Central Business District (CBD) and 3 kilometres East of Fremantle CBD. ***Figure 1*** provides an overview of its location and major features.

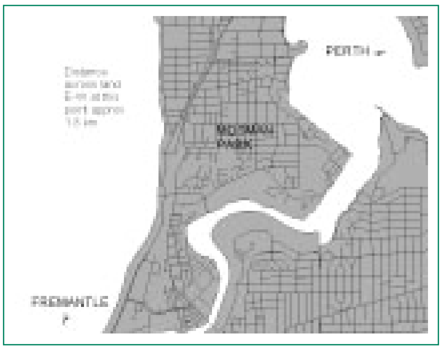

Figure 1: Mossman Park and immediate environs

The LG is almost entirely residential with a mix of single and two storey dwellings and a small number of apartment style buildings up to six storeys high. The buildings vary in age from the early 1930's, though the author estimates a median age of approximately 1960 (Barradeen, pers. comm.). Most structures are of double brick and tile construction. There a small number of retail outlets confined to three small areas. There are no industrial sites. There are a number of public buildings including five schools.

Standards of construction vary with age and the building standards that prevailed. It is reasonable to assume that the older building stock will not possess the same structural integrity due to standards applied at the time of construction and general deterioration over time (Barradeen, pers. comm.).

The 1999–2000 WA Municipal Directory indicates a population of 8,200 housed in 3,500 dwellings in an area of 4.3 square kilometres.

Date	Location	Comments
24 July 1958	Mosman Park	significant property loss
13 June 1969	Swanbourne/Peppermint Grove	suburbs immediately adjacent to Mosman Park
25 August 1999	East Fremantle	suburb immediately adjacent to Mosman Park - severe damage to apartment block and numerous houses

Table 1: events that have affected the study area to date

According to the Australian Bureau of Statistics 1991 Census the median age was 32. The same census illustrated some interesting demographic profiles. It is clear that there is great diversity of population across the LG. It is apparent that there are a broad range economic and social profiles within the LGA. For instance, an area approximately 0.25 kilometres square located on the western edge of the LG—in which almost all of the high density apartment style buildings are located—is an area containing the lowest incomes, non-english speaking persons, minority groups, unemployed, least qualified, single parent families and the greatest social dependence. The rest of the LG is at the middle and higher end of the social spectrum, containing high income earners, highly qualified persons, the least unemployed etc.

The ***Table 2*** illustrates the potential interaction between the identified source of risk and the elements at risk using Salter's Risk Identification Matrix (1997, p14).

Elements at Risk	Source of Risk - SLWS
Lifelines & Infrastructure: ground utilities, roads, rail, communication towers	Direct wind damage or via wind-borne Above-debris/tree falls
Industry & Commerce: Shops – small business	Direct wind damage to structures that limits or stops business continuance. Wind borne debris/trees limits or stops access to premises
Citizens: individuals and families within and to/from dwellings	– Injury or death due to wind-borne debris/trees – Dwellings damaged by direct wind damage or by wind-borne debris, property loss possibly rendering dwelling uninhabitable. – Income or other social opportunity loss (appointments etc) due to disruption to lifelines/ infrastructure
Environment: streetscape, park and residential lot vegetation (predominantly trees – no 'natural' vegetation)	Vegetation loss by direct wind damage

Table 2: the potential interaction between the identified source of risk and the elements at risk using Salter's Risk Identification Matrix.

Analysis

Criteria

For the purposes of this paper, the following criteria have been established. (It is understood that under normal circumstances a community consultative process would inform the criteria selected.)

- Lifelines & infrastructure—no more than one 24 hour outage in any one service over 5 years.
- Industry & commerce—no more than a week's outage for any one business over five years.
- Citizens - no more than one death over ten years. No more than one injury per year. No more than one damage event rendering a dwelling uninhabitable over ten years. No more than one event isolating persons from normal activities for more than 24 hours over a five year period.
- No more than one event rendering a park, roadway or path unusable for more than 24 hours over five years

Existing controls

The following controls, listed against the elements at risk, are currently in place as far as the author can ascertain.

- Lifelines & infrastructure—design and construction of rail and telecommunications (towers) facilities incorporates some ability to withstand extreme wind events. Telecommunications cables are predominantly under-ground. The electricity grid has some very limited capacity to withstand extreme wind events. Vegetation management to limit powerline interference is undertaken regularly. A program of placing the electricity grid underground is set to commence in 2001. Large response capacity by relevant service companies are all within a few kilometres.
- Industry & commerce—new structures are built to the Building Code of Australia and therefore have some capacity to withstand strong winter winds. Older structures are built to a variety of dated standards.
- Citizens—structures vary in their capacity to withstand strong winds based on their age and the standards prevailing. It is apparent that some provision for better wind resistance construction (e.g. tile tie-downs) in dwellings built in later years. State Emergency Service (SES) prevention and preparedness advice provided through media 'community service' style announcements and publications(very limited) aimed at vegetation hazards and household response preparedness. Response service provided by SES and Fire & Rescue Service (FRS). FRS station is within 3 kilometres and SES is located some 10 kilometres away.
- Environment—regular vegetation maintenance/management in all parks and reserves undertaken by LGA. Private vegetation managed on an individual property-by-property basis.

Frequency/likelihood

Based on historical data (Foley & Hanstrum, 1989), the frequency of SLWS has been 1.6 per annum. Given that the study area occupies a small slice of the coast, 1.6 events per annum within the 'slice' are unlikely. It is however clear that they can and do occur in the study area, though the frequency is hard to estimate. Therefore the likelihood of SLWS impact is, in the author's opinion, certain, the timing and interval is not known.

Impact

The impact characteristics of SLWS have been well documented (Foley & Hanstrum). A typical SLWS will create an impact zone of approximately 100-300 metres wide and up to several kilometres long. Given this scenario, if one were to overlay a 200 metre wide SLWS path across the full width (2 kilometres) of the Mosman Park LG in a central location, the potential damage could include hundreds of dwellings, at least one school, two small businesses and an apartment block.

Injuries and death are possibilities. Damage to the power grid would be extensive, possibly leading to extended power outages. Extended power outages would affect food storage and traffic control devices. Access to and from the area would likely be affected by damage debris and damaged vegetation. Some families and individuals would be homeless.

Assessment

Table 3 is an assessment of risks against the established criteria.

Discussion

It is apparent that there are some common themes that run through the risk assessment. They are:

- ***The power grid*** is one of the most vulnerable elements at risk. Failure of this has considerable 'knock-on' effects as infrastructure, commerce and industry and citizens are dependent on its supply.

Element at risk and criteria	Assessment commentary
Lifelines & infrastructure—no more than the one 24 hour outage in any one service over 5 years	The most vulnerable element appears to be power grid. Failure of same has numerous knock-on effects.
Industry & commerce—no more than a week's outage for any one business over infrastructure five years	Vulnerability mainly linked to standard of structure. Dependence on lifelines/ (power) also noted.
Citizens—no more than one death over ten years. No more than one injury per year. No more than one damage event rendering a dwelling uninhabitable over ten years. No more than one event isolating persons from normal activities for more than 24 hours over a five year period.	Vulnerability mainly linked to standard of structures. Dependence on lifelines/ infrastructure (power) also noted. Vegetation loss may, in some instances, contribute to property loss.
No more than one event rendering a park, roadway or path unusable for more than 24 hours over five years.	Vulnerability of parks, roadways and paths linked to vegetation loss.

Table 3: assessment of risks against established criteria.

- ***Structural standards*** affect commerce and industry and citizens ability to withstand SLWS. A structure's age, standard of construction and extent of maintenance are all like factors in this category.
- ***Vegetation maintenance*** affects the vulnerability of structures.

It is the author's contention that the order of risk priority for treatment is as listed above i.e. 1. Power grid, 2. Structures and 3. Vegetation.

Treatments

Table 4 provides an overview of the three priority risks, their treatment options and brief discussion points.

Treatment challenges

Central to the success of implementing treatments will be the involvement of the LG, the Mosman Park community generally and other stakeholders such as the utility companies.

Given LGs pivotal role in the provision of local services, links with numerous local community groups and its representative Council, it appears to be ideally placed to bring together the elements necessary to give effect to reducing the communities exposure to SLWS. Most of the treatment options listed in the table are linked to the LGs responsibilities (particularly Vegetation and Structures through LG services or building controls). It is often said that a LG is 'closest to the people' and 'knows' its community more intimately than any other layer of government. Though this paper has highlighted a potential risk to community safety, there are numerous priorities and attendant resource demands that face the LG—the SLWS risk may not rank highly in view of the competing demands!

The perception of risk within the community and whether SLWS is seen as a risk worth doing anything about, will be a significant challenge to implementation.

Element at risk	Treatment option	Discussion
1. Power grid—prevention	Strengthen existing systems. Accelerate 'under-grounding' program	Both would reduce vulnerability of grid in short and long term, though both costly.
Power grid—preparedness	Identify areas of weakness in system. Prepare contingency plans.	The identification of weaknesses would be very useful to target works. Contingency plans ought to exist in any event.
Power grid—response	Provide more response services.	Existing response difficult to improve without considerable cost implications and minor benefits.
Power grid—recovery	Prepare alternative power plans. Provide more assistance to business/citizens.	Contingency plans ought to include alternatives and assistance programs.
2. Structures—prevention	Audit building stock and identify weaknesses. Mandate higher standards across all buildings. Provide subsidies for building upgrades	An audit would be essential in order to target areas of weakness. It may also bring other benefits and be part of a wider study.
Structures—preparedness	Prepare contingency plans (alternative accommodation etc).	Ought to be part of an essential Emergency Management (EM) Plan for the LG.
Structures—response	Provide closer/better/more resources.	Support to/for the SES unit may need to be reviewed to ensure adequate support.
Structures—recovery	Produce community recovery plans and provide more programs/resources.	Ought to be part of the LGs EM Plan and an annual budget item.
3. Vegetation—prevention	Audit all vegetation for weaknesses. Institute vegetation modification plan based on identified weaknesses. Provide greater public education.	An audit is essential to enable targeted programs. It may also form part of a wider study. Public education ought to be considered in the LGs EM Plan.
Vegetation—preparedness	Provide public education as to citizen/business preparedness.	Ought to be part of LGs EM plan. Alternatively or in addition liaison with SES to build-on or extend existing programs.
Vegetation—response	Plan for and provide more resources.	Ought to be park of a Parks and Reserves management plan for the LG.
Vegetation—recovery	Plan for and provide more resources.	Ought to be park of a Parks and Reserves management plan for the LG.

Table 4: an overview of the three priority risks, their treatment options and brief discussion points

The LG ought to be the integrative and educative agent through which the community is made aware of the risk, is convinced that the risk is not sufficiently attended to and that behaviour must change to lower the communities risk (the treatments).

Another challenge involves the company that controls the power grid—Western Power. Though there is no reason to suspect that the company will not regard the risk at serious, there are unique pressures that commercial operations face. Western Power is a corporatised government authority i.e. it is structured and acts like a commercial entity while it remains publicly owned. The company may consider the risks to be acceptable and may not be willing to expend resources in a limited area for little perceived commercial benefit.

The ultimate measure of success will be to see if anything changes in terms of SLWS risk in the coming years. The author has suggested some possible SLWS risk criteria earluier in this paper. The criteria—either in the original form or as a result of a more comprehensive and community based study—can be used to meaure performance over time. As they say, time will tell!

Conclusion

This paper has provided a brief examination of risks associated with Severe Local Winter Storms in the LG of Mosman Park. Practically all of the risk analysis and assessment has been qualitative. Only the broad scale estimate of SLWS frequency was quantitative, based on outside research. By describing the effects of the chosen source of risk on the chosen area and illustrating some of the impact parameters by description and qualitative terms, a general 'feel' for the level of risk has been obtained.

The author avoided the use of matrices that directly set two dimensions against

New Disaster Website

Disasters on the Web: providing an index to information for Victoria, Australia

DISASTER
WWW information
VICTORIA

A new Web site launched in March 2001 at GDIN2001 in Canberra has been developed under a grant from EMA to explore how disaster-related information on government and other Web sites can be located and made available to the community.

Why this Web site?

Disaster information is hard to find quickly on the Web, and what is found may be incomplete or inaccurate. However, much information is available if a thorough search is made.

Rapid access to this data is important both for the disaster worker, the media and the general public. This Web site has been set-up to provide an up-to-the minute clearing house for such data for Victoria, and could be extended to cover Australia and the South Pacific region.

This Web site is designed to help 'improve community awareness of risk, preparedness and response' (Australian Goal 1) and also provides useful information for schools (IDNDR Major Theme 2. Education 2000) in the primary, secondary and tertiary curricula, by making use of the Internet, and developing each other by choosing to describe the context and what might be expected. Naturally, should the study have been more thorough and required more definitive recommendations to the LG for instance, a number of qualitative and quantitative studies may have been required to support more detailed recommendations.

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Authors contact details

Mal Cronstedt
Operations Services Officer
Fire Services
Fire & Emergency Services Authority of WA (FESA)
480 Hay St Perth
phone: 08 9323 9345
fax: 08 9323 9354
mobile: 0418 954 147
Email: MCronstedt@fesa.wa.gov.au

and evaluating the effectiveness of a Web-based current disaster information service.

Likely users

The site is aimed at individuals and groups, such as families, travellers, retired people, as well as schools, Universities, and organisations such as councils and shires, and community volunteer groups. Others involved with disaster work, such as local disaster workers, media reporters, and members of the insurance industry, should find the site useful.

Increasingly individuals and groups in Victoria have Web access but may be still learning how to find information, and having difficulties getting prompt and easy access to information from rapidly-growing and complex government Web sites.

Experience in developing the site has demonstrated that disaster information is often posted first on media sites - newspapers, radio, and television - and such sites as the Bureau of Meteorology. Using these sites, and understanding their techniques of posting and archiving information, can be a problem to many users, and the new disaster Web site helps by providing appropriate direct links.

The Web site

The site provides a starting point for seeking disaster information for Victoria, with a guarantee of up-to-date and accurate information, and links to information on individual disasters, indexed by type. Geological, meteorological and human-caused disasters are all included. Links to further information on the region in which a disaster has occurred e.g. satellite imagery, maps, climatic data, links to researchers with a prior knowledge of the area, and to available scientific and other publications, reports and data sets is also being provided when available.

In addition, the site is developing data sets of background information, including information on the study and understanding of such disasters as earthquakes, landslides, floods, storms and fires. A related new site which is beginning to develop information on the risks and hazards associated with possible future volcanic activity in Southeastern Australia is also being linked to this disaster Web site for Victoria.

The site is already benefiting school teachers and pupils and helping with student project work in a Victorian secondary school. Trials of the site have been carried out at university level in a natural hazard course at The University of Melbourne. It has been demonstrated to a group of Australian disaster workers and is now being released to the media, and the general public.

A ***project background*** page provides links to discussions of the concepts behind the project, and includes a PowerPoint conference presentation and paper, and discussion papers on searching for disaster information on the Web, including case studies of the January 2000 Hazelwood fire and the earthquake and tsunami near Rabaul in November 2000.

The site is currently housed on a University of Melbourne server, and is most easily located via the Web URL: www.disasters.au.com

Further reading

Joyce, E. B. 1999. Disaster information on the web: providing an efficient index to current and reliable information, Disaster Prevention for the 21st Century, Proceedings of the Australian Disaster Conference 1999, Canberra, 1-3 November 1999, pp. 321-326.

Further information

Bernard Joyce
Senior Research Fellow
School of Earth Sciences
The University of Melbourne
Victoria 3010
Australia
Email: ebj@unimelb.edu.au

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