

# Disaster waste management following the 2009 Victorian bushfires

Charlotte Brown, Mark Milke and Erica Seville examine the waste management decisions made after the Black Saturday bushfires.

## ABSTRACT

The 2009 Black Saturday Bushfires in Victoria, Australia, killed 173 people and affected 430,000 hectares of land. Before communities could begin to rebuild, tonnes of burnt and potentially hazardous debris had to be removed. Interviews were carried out with professionals involved in, and community members affected by, the debris waste management process. The data collected indicated that although there had been little prior planning for how to deal with disaster waste on this scale, there was a collective response to move with urgency towards a common goal: to remove public health hazards and to get communities into the rebuilding process as quickly as possible. Five key decisions were made during the clean-up process: the establishment of the Victorian Bushfire Recovery and Reconstruction Authority; full government funding for building demolition; the single waste classification; the appointment of a single managing contractor; and the construction of a new landfill cell. For each key decision the following are analysed: the decision-making process; delays; organisational considerations; legal implications; and environmental, economic and social effects. Overall the demolition and debris removal response was successful, however, the response would have benefited from greater prior planning. Planning is necessary to give decision-makers the tools and information necessary to make timely, effective and coordinated decisions after any given event. A full report, including additional references and interview details, is available at [www.resorgs.org.nz](http://www.resorgs.org.nz).

## Introduction

The 7 February 2009 “Black Saturday” bushfires in Victoria, Australia, were the most devastating bushfires in Australian history. 173 people were killed in 78 communities and over 430,000 hectares of land and 2000 properties were destroyed (VBRRA, 2009).

Due to the intense heat of the fires (up to 1200°C) (Victorian Bushfires Royal Commission, 2009), many of the affected buildings were reduced to piles of twisted metal, masonry rubble and ash. The waste matrix included mixed ash, concrete rubble and bricks, partially burnt dimensional timber and fence posts (treated), metal, vegetation and trees, household hazardous wastes (including asbestos), vehicles and corpses (removed by the Coroner). The Commonwealth and State governments elected to pay for and facilitate demolition and removal of all building related debris in the affected areas.

This research looks at the waste management process during the recovery phase of the bushfire response. This case study will be used by the authors as part of a wider study on disaster waste management systems. The aim of the wider study is to develop a strategic and integrated approach to planning for and responding to disaster waste.

There is a full length case study report, including additional references and interview details, available at [www.resorgs.org.nz](http://www.resorgs.org.nz).

## Disaster waste management background

Depending on their type and severity, and the nature of the built environment, disasters can create large volumes of inert and hazardous debris. Recent natural disasters such as the 2010 Haiti earthquake (Booth, 2010, Johnson and Correa, 2010, Kahn, 2010), Hurricane Katrina 2005 (Luther, 2008, USEPA, 2008, Brown and Milke, 2009), and the 2004 Indian Ocean tsunami (Basnayake et al., 2005, Petersen, 2006) have all generated volumes of waste which overwhelmed existing solid waste capacities and required extraordinary management approaches.

Disaster debris can impede rescuers and emergency services reaching survivors; inhibit provision of lifeline support; pose a public and environmental health hazard; and hinder the social and economic recovery of the affected area. Poor management of a clean-up effort can result in a slow and costly recovery which is potentially risky to public and environmental health in both the short and long term.

The first and most comprehensive national guidance on disaster debris management was the USEPA's "Planning for Disaster Debris" (USEPA, 1995) which was updated in 2008 (USEPA, 2008). Outside the US, understanding of the need to plan for debris management is growing (Johnston et al., 2009, JEU, 2010).

Due to the destructive nature of fires, there is typically less debris than other disasters (USEPA, 1995). There are few documented accounts of waste management following fire events, those reported include the 1991 Oakland firestorm (State of California, 1997), 1993 Malibu, California, coastal fires (USEPA, 1995), 2000 Cerro Grande wildfires (USEPA, 2008) and 2003 Cedar and Pines Fires, San Diego (County of San Diego, 2005). A range of waste management options were employed across these disaster responses (largely due to varied environmental and public health hazard assessments), including private property clearance by property owner; local government facilitated cleanups; a combination of insurance, federal and local government funding; and mixed efforts to recycle.

## Case study approach

The case study analysis follows the principles set out by Yin (2009) in *Case Study Research, Design and Methods*. The framework for the analysis is to form a case description of the waste management process using strategic decision points as the unit of analysis. These decision points determined the path and in turn overall success of the waste management process and it is likely that many of these same decision points will also be faced by future disaster waste managers. Being able to anticipate what decisions will have to be made, what the likely impacts of the decision will be, how to better make these decisions and what information is needed to do so will help position communities to respond better in the future. The analysis was informed by both interviews and the study of pre and post-disaster literature.

For each key decision, the analysis focused on: the decision-making process (how and why the decision was made); the delays associated with the decision; the organisational aspects of the decision; the legal constraints; and the environmental, economic and social effects. The ultimate aim of this case study is to use these categories and the technique of pattern matching (Yin, 2009) in a cross case study analysis of waste management programmes. The analysis will determine the major drivers and barriers for waste management decisions and will lead to a framework for future disaster waste management.

Interviews for this case study were conducted with professionals and community members both involved in and affected by the waste management following the Bushfires. The interviews were carried out in August 2009 and March 2010, six and 13 months after Black Saturday respectively.

In total, eight professionals (including contractors, private waste firms, council waste managers, government regulators and disaster managers) and 14 community members were interviewed using a semi-structured interview approach.

## Analysis

A flow diagram summarising the decision-making associated with the waste management process is shown in Figure 1. The diagram is a chronological account (although not to scale) and shows the events that occurred (star shape), the activities that took place (rectangular boxes), the decisions that were made (diamonds) and any delays that occurred (a pair of vertical parallel lines). The diagram is also divided into 3 levels (local authority, state government and individual) to indicate who undertook the decisions and/or activities. Arrows are used to show the flow through the diagram

### Decision 1: Establishment of VBRRRA

Due to the scale of the disaster, the Commonwealth and Victorian Governments elected to establish the Victorian Bushfire Recovery and Reconstruction Authority (VBRRRA) to "guide the recovery and rebuild process" (VBRRRA, accessed 2010). The decision to form this authority was not directly related to management of the bushfire waste, however, it is included here as VBRRRA forms the umbrella of the entire disaster recovery system, of which debris management forms a part.

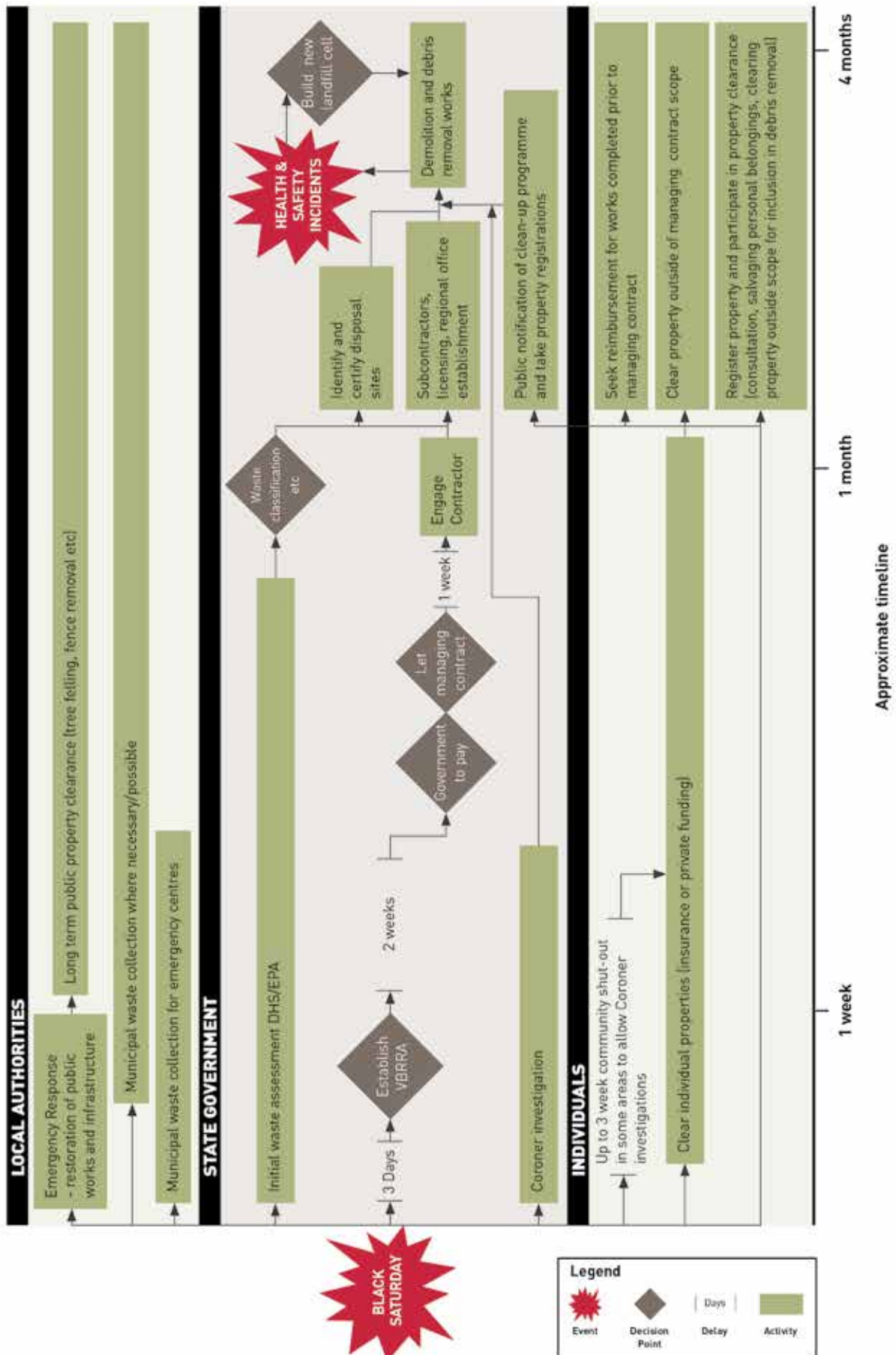
Overall the timely establishment of VBRRRA played a positive role in the waste management process. VBRRRA took overall responsibility for the waste management programme, gave a focal point to the community for waste management issues and initiated the coordination of the appropriate regulators and contractors to implement the project. The main weakness of this approach was the limited longitudinal involvement of specialised waste management personnel in the strategic development of the waste management approach. If VBRRRA had not been established, waste management would have been the responsibility of the already overwhelmed local government authorities.

### Decision 2: Government funding

Two weeks after Black Saturday, the Commonwealth and State Government of Victoria elected to jointly pay for and facilitate the demolition and debris disposal of private and public buildings destroyed by the bushfires – a responsibility which would ordinarily rest with private property owners and municipalities, respectively.

Justification for the decision to fund the demolition and debris removal was to clear debris and hazardous

FIGURE 1. 2009 Victorian Bushfires waste management decision flow chart.



materials from bushfire affected properties and to help start people rebuilding (The Premier of Victoria, 2009) and in turn benefit the economic recovery of the community.

The decision required political and financial support which took time to establish. However, if no funding had been provided significant delays in the demolition and debris removal would have arisen. In particular, it would take time for insurance payouts, charitable donations and possibly government grants to be assessed and awarded before individual property owners could facilitate clean-up works. These delays would also have potentially exacerbated any negative environmental, social and economic impacts.

In general, government funding of private property demolition and debris removal in this case was very successful. The initiative had the desired effect of facilitating a timely and well coordinated community wide clean-up operation. There are two possible disadvantages of providing government funding. The first is the potential for setting a funding precedence for future disasters such that the community expect government assistance and do not insure for management of disaster waste. The second is the limited scope of the government funding programme. In the Bushfire case, individual property owners were responsible for any clean-up works outside the scope of the government funded and facilitated (refer Section 4.4) clean-up works. There was a general reluctance to carry out the work due to an expectation that the government should or would provide additional funding. There were also reported instances of illegal dumping from residents unwilling to pay the high disposal costs. There appeared to be limited efforts by local authorities to provide public information on and facilities for appropriate management of waste not covered by the government scheme.

### **Decision 3: Single waste classification and management procedures**

To expedite debris removal and minimise hazards to people and the environment, the Victorian Environmental Protection Agency (EPA) and the Department of Human Services (DHS), based on limited site testing, elected to classify all bushfire waste as a single classification. The classification assumed the waste was Construction & Demolition waste plus other contaminants, including Class B (non-friable) asbestos. Provisions under Section 30A of the Victorian Environmental Protection Act, 1970 and Section 55 of the Dangerous Goods Act (Victorian Government Gazette, 2009), 1985 were activated to formalise the classification. The combined regulations stipulated stream-lined handling, transportation and disposal methods for management of the bushfire waste.

Coroner investigations in the affected area and the time taken to decide that the government would fund the clean-up meant EPA and DHS had approximately four weeks to establish processes for waste handling, transportation and disposal. However, in another event, a four week delay in establishing waste management procedures may not be acceptable, especially if significant acute hazards existed in the waste matrix and threatened residents, or if debris management were required for search and rescue activities (such

as after the 2011 Christchurch Earthquake). If no over-arching classification had been made, each site would have had to be independently assessed or tested for contaminants causing significant delays, public concern and increased disposal costs (for contaminated materials).

The single waste classification expedited the speed of the cleanup works with both minimal environmental and health and safety risk to waste handlers and the public. The legal arrangements that allowed for the waste classification were straightforward to implement and effective despite the absence of clear guidance on how emergency waivers should be assessed.

### **Decision 4: Centralised demolition and debris removal contract**

Three weeks after Black Saturday, the State government let a single "managing contract" to coordinate and to manage subcontractors for demolition and debris removal works. The contract included all public and private buildings destroyed in the bushfires. Individual property owners were not required to participate, other than salvaging of personal belongings if desired.

The contract was awarded to an Australian building contractor called Grocon. Approximately 70% of subcontracts (and 50% of the labour) were sourced from the local community.

Despite the initial delays associated with letting the contract (which were in parallel with Coronary investigations), the centralised demolition and debris removal contract accelerated waste removal and demolition works and led to quality work. If property owners had been required to facilitate their own clean-up, it would have been extremely difficult to ensure rapid and safe debris removal.

The majority of respondents agreed that the centralised demolition and debris removal contract, implemented by Grocon, for debris removal was a success. The centralised demolition and debris removal contract allowed for efficient removal (within the six month completion target) and streamlined and consistent health and safety and environmental procedures across all affected areas. Organisational structures were simple and economy of scale for the physical works (including resource allocation) was also possible. The major drawback to the centralised demolition and debris removal contract was the limited community consultation and use of non-local labour.

### **Decision 5: Construction of a new landfill cell**

The majority of the bushfire waste went to existing municipal waste landfills a significant distance from the affected area. However, due to several incidents involving waste-laden trucks travelling on a dangerous stretch of road, an urgency developed to find an alternate disposal site. An area at an existing landfill site (owned by Murrindindi Shire) was identified. A landfill cell was designed (at a lower specification than other landfills receiving the bushfire waste), consented and constructed in just 10 days. After construction and operation of the cell by Grocon, it was capped

and handed back to Murrindindi Shire. The 30 year maintenance requirements for the landfill cell remain with the Shire.

The essence of this decision was whether or not an additional facility with a potentially higher environmental risk, should have been used to reduce an occupational health and safety hazard. It is unclear how these potential effects were assessed, traded-off and justified and who carries the liability for this decision.

The fast design, construction and consenting process showed good collaboration between organisations. The new landfill significantly reduced health and safety risk to the public and the truck drivers and reduced haulage costs. However, the execution of the new landfill siting and consenting could have been improved. The assessment process and justification for the reduced environmental standards (based on a health and safety risk) was unclear and seemingly undocumented. In addition, the expedited processes used for consenting has the potential to introduce future liability issues at the site.

## Communication

An overriding theme within all the above decisions is communication, including: gathering information to assist in decision-making; facilitating decision-making (inter-agency communication); informing the public on how decisions were made; and educating on individual's responsibilities.

In general, the inter-agency communication was reactionary – due to the absence of a plan - but effective. Roles and responsibilities were undefined and overall responsibilities for various aspects of the waste management process were unclear and established in an ad-hoc fashion. Despite this the necessary outcomes were achieved.

Communication of the waste management decisions with the public, however, was less effective. The State Emergency Recovery Plan (Emergency Management in Victoria, 2005) outlines that community communication plans should be established 'as soon as practicable' in the recovery process. Despite this no community-wide consultation was carried out prior to establishment or during implementation of the clean-up programme.

Effective communication may have short-circuited some of the community dissatisfaction. Health and safety concerns and potential environmental impacts would have also been mitigated for individual clean-up operations.

## Discussion

One common theme from the interviews was a general reluctance to plan for waste management for disasters. Other authors have also observed a reluctance to plan and effectively mitigate bushfire risk in Australia in general (Underwood, 2009). There are several possible reasons for this viewpoint:

- The perceived difficulty in planning for the unknown.

- The low frequency of such large scale disasters.
- The success of this particular debris management process (implemented without a plan in place).

Despite the relatively effective reactionary waste management response following this event, waste management planning is needed to reduce waste's lingering impacts (Solis et al., 1995, Reinhart and McCreanor, 1999, USEPA, 2008). A key step to improve disaster waste management is, consequently, transcending the paradigm that planning is not possible or useful.

A possible approach to flexible and transferable disaster waste management plans is to develop the plan around decision points. This can be achieved by anticipating: what decisions will need to be made; who should make the decision; what information will be needed; how the decision will be made; and how the decision will be communicated and then implemented. This approach may be considered more effective than instituting operational plans which may not be appropriate for every disaster situation. Future research is planned by the authors to test this hypothesis.

## Recommendations

In the Victorian context, the first and most important step is to prepare disaster waste management plans at municipal level. The plans must include clear pre and post disaster consultation and communication strategies. The plans must also be flexible enough to apply to the spectra of likely disaster events - writing a plan around decision points, as discussed above, is one possibility in ensuring plans are adaptable to different situations. The plans should:

- Establish an organisational structure with roles and responsibilities, and decision-making delegation that fits within the overall recovery framework. This should include solid waste professionals and community representatives.
- Determine a funding policy - for example a tiered approach based on disaster impact. Private property owner and government responsibilities should be well defined and the role of insurance included.
- Establish maximum acceptable environmental and health and safety risks for different levels of disaster impact and methods of assessing those risks. Consider whether legal provisions need to be bounded to reflect these standards.
- Establish strategies for the physical works, alongside the tiered funding strategy above. Consider state and local responses, property owner roles and responsibilities, contractor involvement and local labour use.

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## Conclusions

Overall the demolition and debris removal response following the Victorian Bushfires was successful. While the response was effective in this case the same approach may not be effective in another disaster situation. Planning is necessary to give decision-makers the tools and information necessary to make timely, effective and coordinated decisions after any given event.

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