

# Building Impact Analysis – 2012/13 Fire Season

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## **Abstract**

*Once a fire threat has passed, it leaves lessons and information that can be used for future events. Building Impact Analysis (BIA) is a function of the NSW Rural Fire Service (RFS) operations that is tasked with collecting data from a community after it has been impacted by fire. Over the recent fire season, BIA teams were deployed to bushfire impacted communities including Coonabarabran, Yass and Cooma. These teams were tasked with the job of gathering data from the impacted area such as the maintenance of their land, the construction quality and materials of buildings and the degree of damage experienced by each dwelling.*

*BIA is a function that not only occurs within NSW, but extends nationwide. In larger bushfire events, the NSW RFS has been called upon to assist in this research in other jurisdictions. These include the Victorian bushfires of 2009 and to Tasmania to assist this past fire season.*

*This paper will outline how a Building Impact Assessment is conducted and the lessons we can learn from conducting such research. It will use data collected from past and recent fires to show similarities and differences between what is assumed knowledge and what actually happened in these events. The data will be used to show trends from differing fire events and how various factors have contributed to Community Resilience from bushfire.*

## **INTRODUCTION**

Building Impact analysis (BIA) is a function of the NSW Rural Fire Service (RFS) operations. In this presentation, I will discuss the reasons we do it, the processes we go through and how we use this information. This data influences our decision making, including the sort of set-back distances which are applied to properties and determining which landscape management strategies are required for mitigating bushfire risk and its associated impacts on the environment.

## **THE PURPOSE OF BIA**

BIA surveys investigate the patterns of loss and the survival of buildings following a bush fire. They also consider the influence of planning and building

controls and their impact on building loss patterns. These surveys investigate the behaviour of residents including their decision making and their actions before and during the fire, to enable improvements to be made in policy and processes. This requires data collection, analysis and review.

## **BIA SURVEY PROCESS**

A survey is conducted as quickly as possible post-fire because sites can be extensively disturbed within days of a fire, removing evidence. Delays in data collection can reduce the quality of data obtained. It is important to have the RFS coordinate this program, because there are sometimes still active fires in the area and the RFS is trained to operate under these conditions.

There are three components of the assessment procedure:

1. **First sweep** – this is a quick assessment of the damage. The information recorded includes: the structure type, degree of damage and where in the landscape it occurs.
2. **Second sweep** – a more detailed survey is conducted, with over 110 questions covering the house and surrounding area including: degree and causes of damage; house design and construction materials, outbuildings and fences; vegetation and ground cover; combustibles in or near the house; water supply & sprinkler availability.
3. **Desktop evaluation** – this involves the collation of data, the analysis and review of information in order to prepare a survey report, which is then provided to the RFS Commissioner.

When there is a significant bushfire event, it in essence tests the local Bush Fire Risk Management plan. The treatments that were applied in that plan, as well as development control measures implemented and the response to hazard complaints are examined. Also examined are other treatments applied as part of other processes, and how they can be effectively used as learning guides.

The BIA is a function that occurs within the Major Operations Control Centre in New South Wales. During the activation process, information can be obtained through the Control Centre about areas that have had major impact or losses, triggering response by a BIA team.

### **BIA SITE SURVEYS**

BIA teams consist of people with a good understanding of construction and building standards. Included are team

members who have firefighting experience and an understanding of how to move around and survive on the fire ground. The equipment currently taken onto impacted sites include some technologies that have been developed since the Victorian Fires in 2009. Toughbooks and PC laptops that are GPS enabled and customised to record the information are used, as well as GPS enabled cameras and digital voice recorders.

During the site surveys, 110 questions are considered during the process, aimed at obtaining a good understanding of construction standards and the degree of damage caused to the building structures. The construction material of roofs and walls, the types of vegetation and possibly the combustible materials that were located around the house, such as woodpiles and caravans etc., are some of the factors examined.

Essentially, the teams are seeking to forensically understand the situations that have led to the buildings being lost in the fires. If the fable of the three little pigs is recalled, where one pig has a house made of straw, the other a house made of timber and the third a house made of bricks, the house which survived the attempts to destroy it was the brick house. However, in real life, I can provide an example of a timber house located in the middle of the bush which survived with a completely interlocking canopy, and a fire that crowned completely over the top of it. On the other hand, there is a brick house which burnt down, so the conclusion in that scenario may be to build a timber house. What is really required is investigation into whether that observed pattern is reflective of what is actually happening.

**BIA DEPLOYMENT 2012-2013 SEASON**

In NSW over the last fire season, 10 surveys were conducted covering over 60 losses (Fig. 1). There is much currently being learnt from those surveys.

At the Dorian fire (Fig. 2), 1 house was lost. This house was built in the 1920s, with very old construction standards.

Also examined were structures at the Old Gibson Plantation fire (Fig.3), where the houses lost were holiday residences with dwellings unoccupied at the time. Only one of the damaged properties was used as a permanent residence.

Date Fire Started	Fire Name	BFMC	House Losses	Houses Damaged	Houses Untouched
05/09/2012	Dorian	Snowy-Monaro	1	-	2
20/10/2012	Gibsons Plantation	Taree	3	2	
20/10/2012	Gungully	Taree	-	-	6
16/12/2012	Geegullalong	Young	-	-	3
23/12/2012	North Logan	Canobolas	1	-	4
02/01/2013	Stanford	Hunter	-	-	14
06/01/2013	Yarrabin	Orana	3	2	3
08/01/2013	Cobbler Road	Harden	-	-	3
12/01/2013	Wambelong	Coonabarabran	53	19	23
18/01/2013	Millingandi	Bega Valley	1	1	3

Fig. 1: 2012 - 2013 Fire Season BIA deployment



Fig. 2: 5<sup>th</sup> September 2012 – Dorian fire: 1 house lost, 2 untouched



Fig. 3: 20<sup>th</sup> October 2012 – Old Gibson Plantation fire: 3 houses lost, 2 damaged.

The three destroyed houses had rough sawn timber as the predominant external wall material. The lightly damaged house had stone walls with some rough sawn timbers and corrugated iron panels. The superficially damaged house had painted weatherboard external walls.

It appeared that most houses did not have ember protection on doors and windows. There was no underfloor protection on the house that sustained superficial damage.

Most of the surveyed properties appeared to have poorly maintained areas around the houses, with trees overhanging houses and continuous elevated fuels within 50m of the houses.

Conversely at Gungully (Fig. 4), there were no houses lost as they had been very well maintained.



Fig. 4: 20<sup>th</sup> October 2012 – Gungully fire: 6 houses untouched by the fire.

The BIA teams strive to collect equal amounts of information on the structures that were lost as well as the structures that survived, so that we are able to compare and learn from them. For example, in the Geegullalong fire (Fig. 5), one house survived because it had a fire hose in the front of the house. The fire burnt right up around and underneath the structure. Direct suppression and resident

action were quite important in saving the house.



Fig. 5: 12<sup>th</sup> December 2012 - Geegullalong fire: 3 houses untouched.

An important point taken into account with the structures that have been lost is whether they are normally actually places of residence or not. Part of that assessment is defining whether a building is actually a house or habitable structure.

Stanford in the Hunter Valley is another occurrence where many house structures survived due to fire fighter intervention. However, the Wambelong fire near Coonabarabran resulted in the loss of 53 houses. There were four bushfire analysis teams over two shifts that collected considerable data from these houses. There were a range of different construction styles and set back distances and very valuable information was gathered.

## INTER-STATE SURVEYS

The RFS BIA teams have also been involved in inter-state assistance. Some went to Victoria after the 2009 bushfires for about 3 months to help collect data. Over 1,500 surveys from structures that were lost in the Victorian Fires were collected. I went to Roleystone in Western Australia to help with the analysis after those fires. Some teams were also sent to Dunalley, Tasmania to assist with data collection. Already,

lessons have been learned from those incidents.

Returning to the analogy about the three little pigs, following analyses by the BIA teams, it turns out that the little pig that built the house out of brick was the one that was better off.

## **CONCLUSION**

From the considerable information received from the BIA surveys, much has been learnt about the importance of construction standards, proximity of vegetation, occurrence of water tanks etc. Close liaison with the CSIRO and the University of Wollongong continues as they utilise the survey information for their data analyses. The information gathered is also used in RFS internal policy development. In the future, there are plans to upgrade the equipment used in the surveys and become more efficient in how the data is collected, including liaison with other agencies for inter-field co-ordination.

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## **BIOGRAPHY**

Dr Simon Heemstra has been employed by the NSW RFS for over 10 years and is currently the Manager of Community Planning. This section is responsible for policy and standards for environmental assessment for hazard reduction, bushfire risk management planning, prescribed burn planning, fuel and vegetation assessment, environmental and risk management research, weather and fire behaviour analysis as well as climate change adaptation. He is also a member of the National Scientific Working Group for the new fire danger rating system and completed a PhD on bushfire patchiness in 2007. He has been a volunteer fire fighter with the Woronora Rural Fire Brigade for 16 years.