

Flood warning and awareness at Blandswood Peel Forest

South Canterbury, New Zealand

Introduction

Blandswood is a picturesque and popular holiday place near the Kowhai Stream at the foot of Little Mount Peel, South Canterbury (135 km from Christchurch). The settlement is located partly on an alluvial fan and partly on moderate to steep range-front foot-slopes. The dominant vegetation is remnant podocarp-mixed hardwood forest.

Despite the idyllic setting, severe flash floods occur here and in 1975 four lives were lost following heavy rainfall.

To reduce the likelihood of future loss of life, the Canterbury Regional Council has implemented a series of innovative flood warning and flood awareness initiatives. These are:

- a flood warning system and flood danger signs
- flood warning notices
- an information brochure
- a flood level sign

These initiatives were developed in consultation with the Blandswood community and other key stakeholders.

The decision to implement these initiatives resulted from the reluctance of the Blandswood community to pay for maintenance of the existing flood protection works and their resistance to relocate from the flood prone site.

The catchment

The Kowhai Stream flows from a steep forested catchment on the southeastern face of Little Mount Peel and comprises an area of about 4.5 kilometres. Little Mount Peel is the highest point in the catchment at 1311 metres above sea level. The dominant basement rock is inter-bedded greywacke sandstone and argillite mudstone.

Weathering and erosion have produced large quantities of unconsolidated regolith, with active faulting also contributing to the large quantity of material in storage. The removal and modification of the indigenous vegetation has also contributed to periodic mass-wasting processes. Debris-flows occur frequently in the catchment and their deposits often form obstructions in narrow rock lined gorges and steep stepped streams.

by Peter Kingsbury, Hazard Analyst,
Canterbury Regional Council,
Christchurch, New Zealand

The flood hazard

Lower Blandswood is located on the active alluvial fan and is exposed to flash floods from Kowhai Stream. This area has been identified as a *flood hazard zone*. Flash floods, as their name implies, occur quickly.

Floodwaters not only rise rapidly but are fast flowing and contain large amounts of debris. They tear out well established vegetation, undermine built

'... I find it almost impossible to describe the change in the Blandswood area from a quiet peaceful spot with a small stream running through it to an area devastated by a raging torrent...'

F David, Department of Conservation Ranger to South Canterbury Catchment Board, 1975

protection works (*figures 2a & 2b*). Since 1975 the Kowhai Stream has aggraded by 2 to 3 metres.

Flood warning

The flood warning system is based on antecedent rainfall, long-range weather forecasting and real-time weather surveillance. A telemetered rain gauge has been installed at Blandswood providing a daily rainfall record (*figure 3*).

A two stage warning system is in place. A Stage 1 alert occurs when a total of 70 mm of rain has fallen over the preceding 14 days (*figure 4*). When this critical level is reached the flood danger signs are changed from *LOW flood danger* to *HIGH flood danger* (*figure 5*). At this time people within the flood hazard zone may be advised directly of the flood alert state.

A Stage 2 alert is declared if heavy rainfall is likely whilst a Stage 1 alert is in place. The Regional Council flood controller, acting on advice from Meteorological Service New Zealand, other Regional Council staff and Blandswood residents makes this decision.

The local Civil Defence officer is advised and people evacuated from the flood hazard zone. Immediate evacuation is essential as devastating flood surges will take only minutes to reach Blandswood. The Stage 1 alert remains in place until the antecedent rainfall falls below 40 mm (*figure 4*).

The flood warning system was developed in consultation with the Blandswood community and emergency response organisations, as was the design, wording and location of the flood danger signs. Graphic designers, communication experts and legal advisors also assisted with the development of the signs.

Flood warning notice

A flood hazard warning notice (*figure 6*) was sent to each property owner in the flood hazard zone. Property owners were encouraged to display the notice in a prominent place in their dwelling.

As many of the properties in the flood hazard zone are rented for short-term holiday accommodation it was considered important that temporary residents were made fully aware of their vul-



Figure 1: Debris piled up against home, 1975



Figure 2(a): Kowhai Stream in 1985 showing the recently completed protective works.



Figure 2(b): The same view of the Kowhai Stream in 1996 showing the significant increase in stream bed-level.

nerability to flooding. On a 'fine' day at Blandswood few people could imagine the potential for destruction and devastation.

Information brochure

A flood hazard information brochure was produced and distributed to local residents. Copies of the brochure are also available from the local store, local authority offices and public information centres.

The brochure summarises the nature of the flood hazard at Blandswood, the flood warning system, what residents and visitors should do during a Stage 1 alert and where additional information can be obtained. The brochure combines text, photographs and other graphics in an informative and easily read format.

As with the danger signs and warning notice the brochure involved input from a range of people, including the local community, graphic designers, communication experts and legal advisors, emergency managers, planners and flood hazard experts.

Flood level sign

A sign indicating the 1975 flood level at Lookout Road is displayed in Blandswood (figure 7). Flood surges, estimated at up to 3.5 metres high, swept through Lower Blandswood in 1975.

Signage showing historic flood extent and/or flood depth is considered a very powerful public awareness tool, but surprisingly seldom used in New Zealand.

Discussion

Provision of information about the flood hazard at Blandswood will hopefully encourage an appropriate public response.



Figure 3: Telemetered rain gauge site at Blandswood

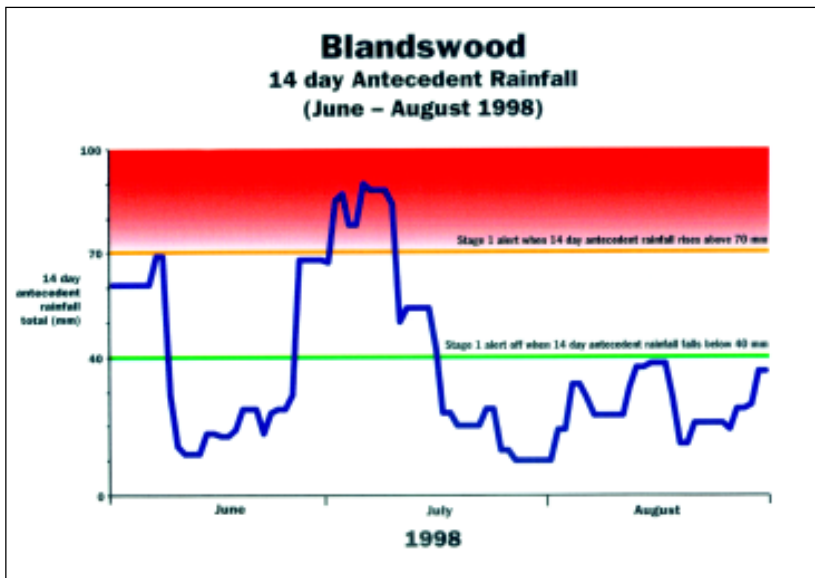


Figure 4: Antecedent rainfall record (June - August 1998)

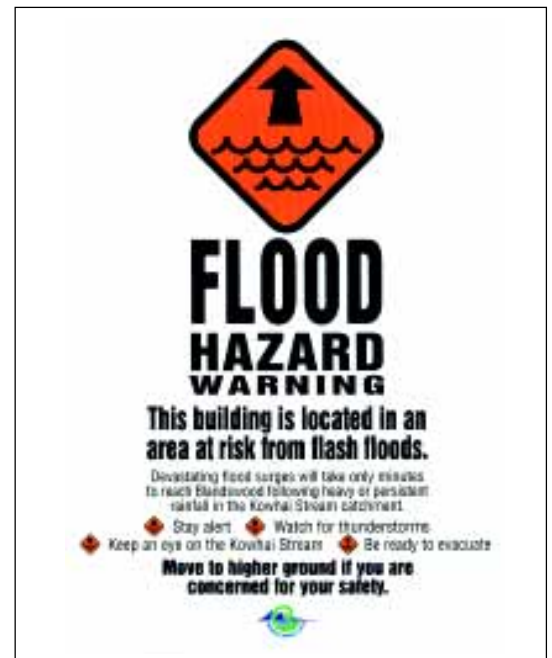


Figure 6: Flood warning notice displayed in homes in flood hazard zone



Figure 5: Changing the flood danger sign to 'HIGH' as the antecedent rainfall threshold (70 mm) is reached.



Figure 7: 1975 flood surge level

Although the majority of the public do not carry out the self-protective measures recommended to them, there is good evidence that hazard knowledge and understanding can lead to appropriate response.

Multiple messages delivered in different formats, but carrying a consistent theme can lead to an interactive personal search for more information and in turn to protective behaviour. To this end, signs, notices and a brochure have been used at Blandswood and periodically presentations are given to the residents.

An 'international' symbol (indicating rising water) has been used deliberately on all signs and documents to link each source of information and provide a common theme (Figures 5, 6 & 7).

An interesting response from residents recently has been that the flood danger

signs are 'too big' and 'too obvious'. This feedback has been largely from those trying to sell their properties.

Some residents have noted fewer visitors in the area generally since the signs were erected. Others have commented on the reluctance of visitors to stop for any length of time during 'high flood danger' periods.

Given the relatively few number of properties at risk (about ten), and when compared with other potentially more vulnerable sites in Canterbury, the resources applied to warn and increase the public's awareness at Blandswood may be (and has been) considered excessive by some. However, most people directly affected by potential flood, consider the level of expenditure appropriate given the consequences of the 1975 flood.

No new development is allowed in the

flood hazard zone, however the risk will remain for many years as existing residents maintain (and in some cases almost rebuild) their dwellings.

Furthermore, access to Upper Blandswood remains under threat from flash floods and deposition of debris.

The initiatives implemented at Blandswood are considered an effective non-regulatory way of reducing the risk to Blandswood residents and visitors, however the risk from flash floods remains significant.

Authors contact details

Peter Kingsbury
 Hazard Analyst, Canterbury Regional Council
 P O Box 345
 Christchurch, New Zealand
 phone: +64 03 365 3828
 fax: +64 03 365 3194
 email: peterk@ccr.govt.nz