Solving Complex Flood Evacuation Challenges

S Molino, T Morrison, E Armstrong

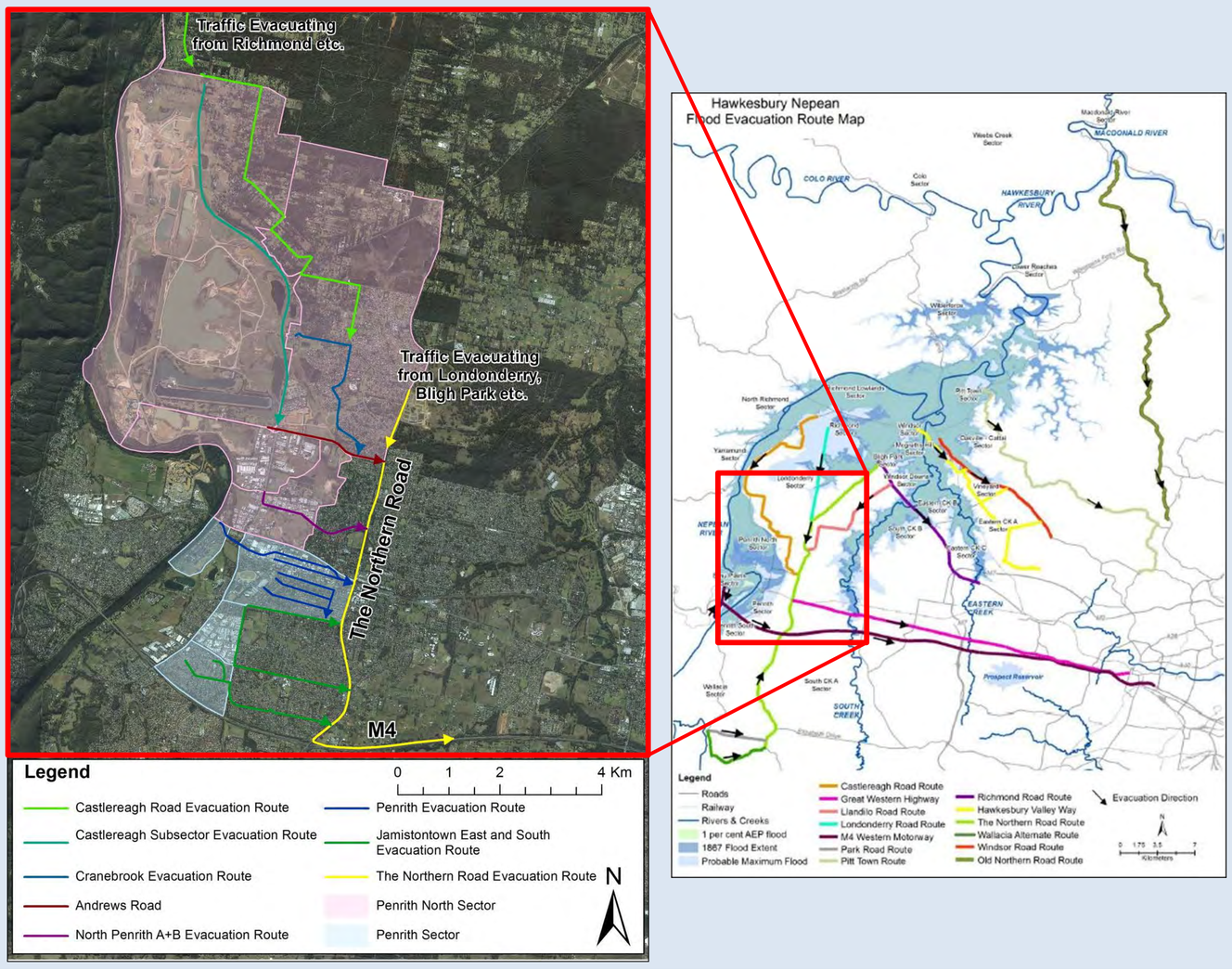
MOLINO STEWART
ENVIRONMENT & NATURAL HAZARDS

Evacuation with the Life Safety Model

More than 73,000 people live below the level of the PMF in the Hawkesbury Nepean Valley. Many evacuation routes out of the towns and suburbs would be cut very early in a flood. Many areas would become isolated on islands that would be overwhelmed by extreme floods. Timely evacuation of at-risk populations is critical to managing life safety.

The NSW SES developed a detailed flood emergency response plan for the Valley and the Timeline Evacuation Model to compare the time needed for evacuation with the time available. Applying the model to the Hawkesbury Nepean Valley is challenging because there are converging evacuation traffic streams from several locations, each with different evacuation triggers .

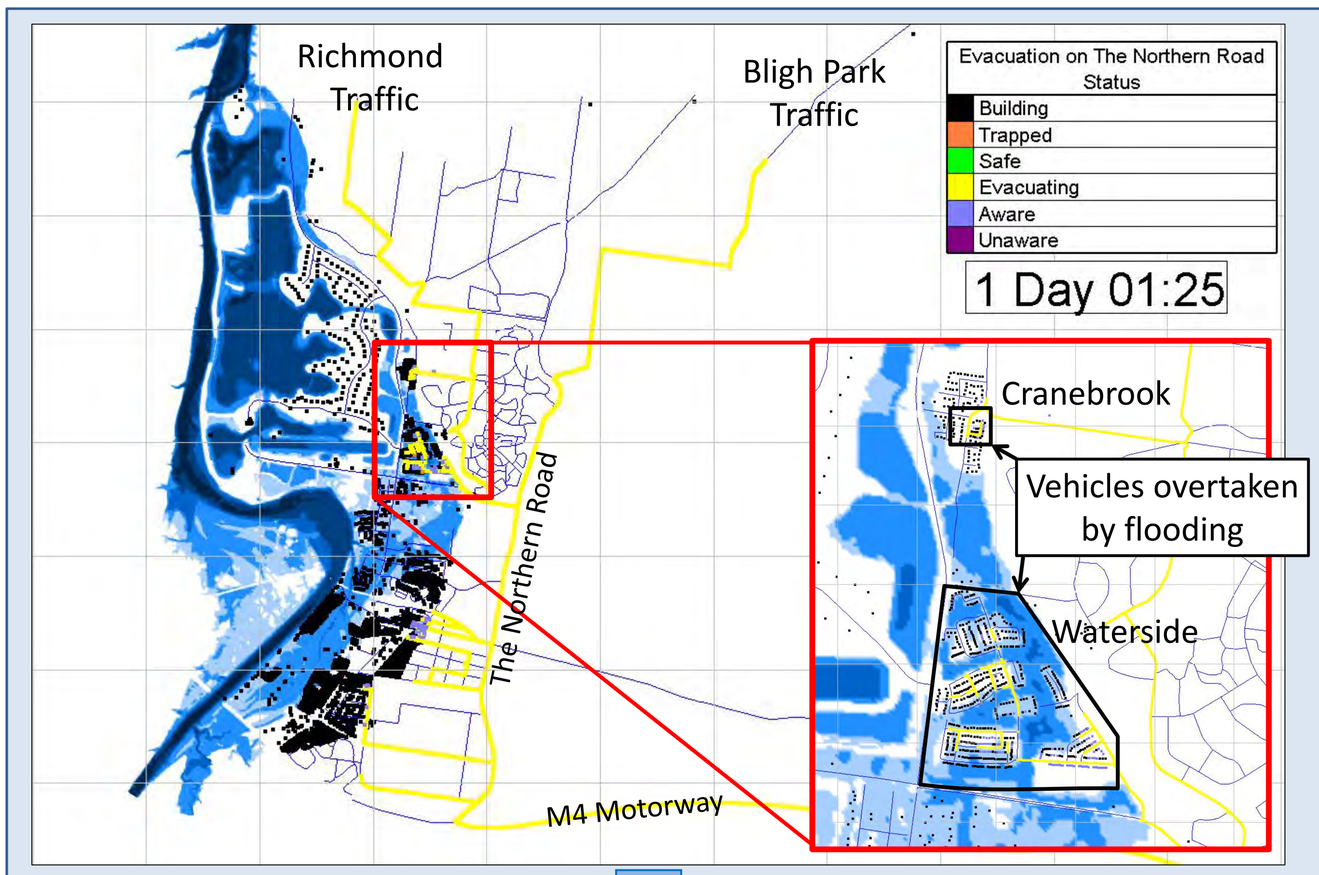
This poster presents investigations into evacuation planning in the Valley using the Life Safety Model.



Life Safety Model

The Life Safety Model (LSM) is an agent-based model integrating two dimensional flood modelling, warning dissemination modelling, evacuation traffic modelling, pedestrian evacuation modelling and evacuee fate modelling.

The LSM was used to analyse the evacuation of more than 35,000 vehicles from several locations converging on The Northern Road at Penrith.



In the worst possible case, traffic from settlements in the north arrives on The Northern Road just as the first of the Penrith Sector traffic begins to evacuate. This would create the maximum simultaneous use of The Northern Road, resulting in the longest traffic queues and the greatest potential for some traffic to be blocked before it is overtaken by floodwaters.

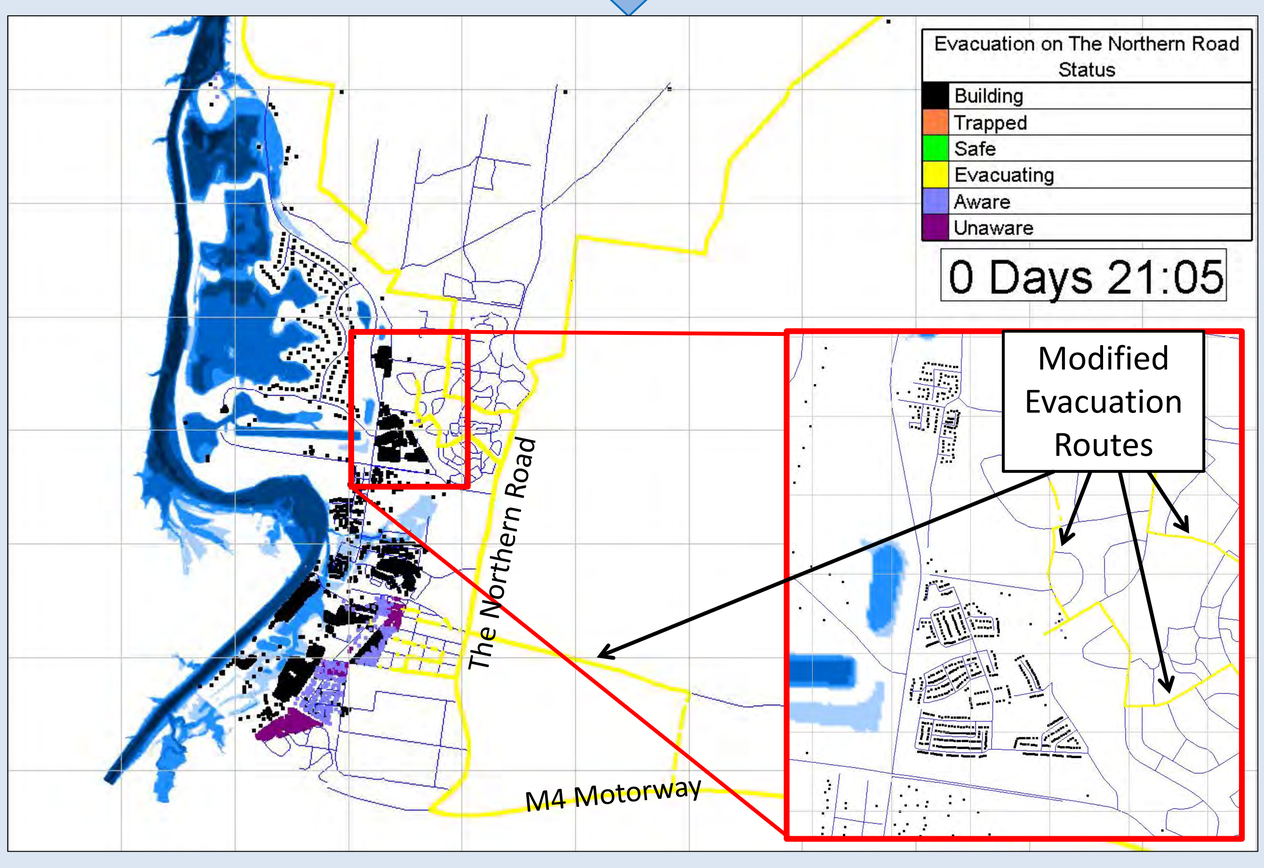
Running the LSM for the worst case scenario shows that traffic from Richmond blocks evacuation from Cranebrook and Waterside. It results in 1,430 vehicles being trapped and overtaken by floodwaters.

Furthermore, flooding downriver would reach the queued traffic evacuating from Richmond before they had fully evacuated and a further 5,751 vehicles would be overtaken by the floodwaters.

A total of 7,181 vehicles would be unable to evacuate.

Test Scenarios

The LSM was used to run different scenarios to test different ways of dealing with the convergence issues, reducing queuing and reducing the risk of vehicles being trapped.



Using the LSM it was found that rerouting of evacuating traffic using existing road infrastructure can reduce queuing and allow all vehicles to evacuation before being overtaken by floodwater.

Improving Evacuation

The use of the LSM in this project demonstrated how the software can be used to identify improvements to current evacuation planning and road infrastructure at a local and regional scale, as well as test the impacts of proposed future development on evacuation.