COST-EFFECTIVE MITIGATION STRATEGY DEVELOPMENT FOR FLOOD PRONE BUILDINGS

Tariq Maqsood[1*], Martin Wehner[1], Ken Dale[1]

[1] Vulnerability, Resilience and Mitigation Section; Geoscience Australia; Australian Capital Territory
* Email: Tariq.Maqsood@ga.gov.au

THE MAIN OBJECTIVE OF THIS RESEARCH IS TO IDENTIFY COST-EFFECTIVE STRATEGIES TO MITIGATE DAMAGE TO RESIDENTIAL BUILDINGS FROM RIVERINE FLOODS. THE RESEARCH WILL PROVIDE EVIDENCE-BASED RETROFIT STRATEGIES FOR DECISIONS CONCERNING THE BUILDINGS WITH THE GREATEST VULNERABILITY IN AUSTRALIAN COMMUNITIES.

INTRODUCTION

Recent flood events in Australia highlight the vulnerability of housing to flooding which originates from inappropriate development in floodplains. These floods have resulted in considerable costs to all levels of government and property owners to repair damage and enable community recovery. This project aims to provide an evidence base to governments and property owners to inform their decision making process around mitigation against flood risk.

PROJECT ACTIVITIES

The key tasks are described below, the first three of which have been completed by the end of June 2016 in line with the project schedule.

Building stock classification

After a literature review a new schema was proposed which is a fundamental shift from describing the complete building as an entity to one that focuses on sub-components (foundations, bottom floor, upper floor (if any) and roof). The selected key attributes to classify each storey type are *Construction Period*, *Fit-out Quality*, *Storey Height*, *Bottom Floor System*, *Internal Wall Material* and *External Wall Material*. The selected attributes to classify roof are *Material* and *Pitch* of the roof (Maqsood et al. 2015a).

Review of flood mitigation options

The review categorises mitigation strategies into elevation, relocation, dry floodproofing, wet floodproofing and using flood barriers (Maqsood et al. 2015b).

Five typical residential storey types have been selected for the balance of the research. Key characteristics of these storey types are presented in Table 1.

Table 1: Selected storey types

Storey Type	Construction period	Bottom floor system	Fit-out quality	Storey height	Internal wall material	External wall material	Photo
1	Pre-1960	Raised Timber	Low	2.7m	Hardwood	Weather-board	
2	Pre-1960	Raised Timber	Low	3.0m	Masonry	Cavity masonry	
3	Pre-1960	Raised Timber	Standard	2.4m	Masonry	Cavity masonry	
4	Post-1960	Raised Timber	Standard	2.4m	Plasterboard	Brick veneer	
5	Post-1960	Slab-on-grade	Standard	2.4m	Plasterboard	Brick veneer	

Cost of implementing mitigation options

Based on the characteristics of the selected storey types a floodproofing matrix has been developed which excludes the mitigation options that are invalid in the Australian context. All appropriate strategies have been costed (see Tables 2 to 4) for the selected building types through the engagement of quantity surveying specialists.

Table 2: Cost of elevation

Storey Type	Elevation (Extending walls)	Elevation (Building a second storey)	Elevation (Raising the whole house)
1	N/A	N/A	$78,200
2	N/A	$213,500	N/A
3	$397,700	$429,700	N/A
4	N/A	$405,200	N/A
5	N/A	$431,000	N/A

Table 3: Cost of dry and wet floodproofing

Storey Type	Dry Floodproofing	Wet Floodproofing	
		Existing structure	Substantial Renovation
1	N/A	$11,700	$68,000
2	N/A	$15,400	$56,600
3	N/A	$17,400	$104,300
4	N/A	$15,500	$140,000
5	$154,320	$17,400	$149,800

Table 4: Cost of using flood barriers

Storey Type	Flood Barriers (Permanent)		Flood Barriers (Temporary)		
	1.0m high	1.8m high	0.9m high	1.2m high	1.8m high
1	N/A	N/A	N/A	N/A	N/A
2	$133,500	$177,600	$62,500	$111,800	$136,300
3	N/A	N/A	N/A	N/A	N/A
4	N/A	N/A	N/A	N/A	N/A
5	$154,300	$208,300	$164,600	$144,100	$176,200

Experimental testing of selecting building components and systems

This research will entail experimental testing of selected building components and structural systems to ascertain their resilience to flood water exposure.

Vulnerability assessment of current and retrofitted building types

The vulnerability of selected storey types to a wide range of inundation depths will be assessed for existing and retrofitted buildings.

Cost benefit analysis

Retrofit options entail an investment that will realise a benefit over future years through reduced average annualised loss. In this exercise retrofit options will be assessed against a range of severities and likelihoods of flood hazard covering a selection of catchment types.

END-USERS PERSPECTIVE

The outcomes of this project will integrate into flood impact and risk assessment. It will enable a better understanding of current flood risk to communities, the demands on emergency management and provide information on opportunities for reducing these.

REFERENCES

Maqsood, T., Wehner, M., Dale, K. and Edwards, M. 2015a. A schema to categorise residential building in Australian floodplains. Proc. Floodplain Management Association National Conference, Brisbane, Australia.

Maqsood, T., Wehner, M., Dale, K. 2015b. Cost-effective mitigation strategy development for flood prone buildings. Report on literature review of flood mitigation strategies. Bushfire and Natural Hazards CRC, Melbourne, Australia.