

Melbourne Water

Flood Management Social Research
Survey

Updated August 2, 2021

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Executive summary

Background

It's estimated that Melbourne has 894,000 properties in flood-prone areas, and floods cause significant damage across Melbourne estimated at \$735 million in damages. As the statutory floodplain manager for the Port Phillip and Westernport region, Melbourne Water is responsible for flood management.

Melbourne Water is responsible for programs to help increase community preparedness and awareness with respect to floods that are associated to the assets it manages. One of these – a partnership with SES – aims to increase community flood resilience in the Port Phillip and Westernport area.

The importance of whole-of community engagement in managing flood risks means that the current community education program must be evaluated to monitor and manage its effectiveness in delivering the intended messages. To achieve this, social research is required to scientifically evaluate the impact of flood education and whether it is effective in increasing the levels of awareness and preparedness in flood-prone communities. This research may serve as an opportunity to improve the current program by incorporating and testing evidence-based techniques to see if they are beneficial for the target audience.

The research objectives for this project are to:

1. Measure and evaluate levels of community flood awareness and preparedness against previous results 2018 and 2015 benchmark respectively.
2. Understand whether different flood engagement initiatives and flood information sources contribute to varying levels of community flood awareness and preparedness
3. Explore changes to barriers to flood preparedness or factors that contribute to people taking flood preparedness actions

Methodology

Four rigorous community engagement methodologies were employed across two phases of research (further details can be found on page 8) .

- **Phase 1** consisted of an *online forum* of n=18 residents of flood areas and n=12 *in-depth one-on-one consultations* with residents of flood prone areas, as defined by a list of flood prone ABS SA1 regions provided by Melbourne Water. This phase allowed researchers to explore the perspectives of residents of flood prone areas – exploring their risk awareness, preparedness, perceptions of floods, and response to stimulus.
- **Phase 2** involved a large scale online survey of n=1,601 residents of flood prone areas, conducted both online (n=1,051) and via Computer Assisted Telephone Interviews (CATI, n=550). This phase allowed for quantification of the flood risk awareness, preparedness, and the myriad of factors that influence these.

Summary of findings

Less than one in five of those in 1% flood areas are aware of their risk... Consequently, residents' awareness that they live in a flood prone area is low, at 19%. While this is much lower than the 44% reported in 2018, this is a result of the change in methodology – while the 2018 research only surveyed communities targeted with SES activities, this research took a much broader view, sampling from all areas identified by Melbourne Water as being at risk of a 100-year flood event.

Experience with flood is mostly with minor and low-impact events... Despite the entire quantitative sample residing in flood prone areas, half (49%) had actually experienced a flood event at their current address. The vast majority of those had only experienced events like overflowing of drains or a few centimetres of water in the street with no personal impact.

Perceived risk of flood is low... This lack of experience with flooding means that members of the community underestimate the likelihood of flood events occurring – just one in ten (10%) felt there was a risk they would be impacted by a flood over the next ten years. Residents are more likely to be concerned with severe weather and storms (49%), extreme heat (47%) and bushfires (17%).

Perceived impact of flood is also low... Both quantitative and qualitative findings reveal that residents are not overly concerned about the potential impacts of flooding. Though there is some minor worry over the potential for damage to property, floods do not provoke the same visceral feelings of fear and destruction that bushfires do. Most consider that a flood might be a mere inconvenience rather than an existential threat.

Experiences of flood are the greatest predictor of flood awareness, with the vast majority (87%) of those aware they live in a flood prone area having experienced a flood. Those unaware they live within a flood prone area tend to explain this deficit on the grounds that they have never experienced a flood, or that if it were a major threat someone would have already told them.

- Influenced by the severe weather and flood warnings issues state-wide in early July, recall of flood safety messaging was relatively higher, at 15% (compared to 9% in 2018). This was spurred by television news and weather warnings issues by the Bureau of meteorology.

Preparedness to deal with flood is minimal... Self-reported flood preparedness in the community is relatively low, with residents feeling more equipped to deal with extreme heat, house fire, severe weather and storms or bushfire. However, those who are aware of the flood risk in their area tend to feel much better prepared (35% mostly or extremely aware compared to 16% unaware they lived in a flood prone area). Residents imagine that they would be made aware of the potential of flooding with enough time to prepare and as such being prepared for a flood was considered important but far from urgent.

However, despite low awareness of flood risk and low self-rated preparedness, results indicate that residents are broadly aware of the various steps they could take to protect themselves and their property during a flood.

Sense of responsibility is external... Importantly, this analysis shows that residents' sense of responsibility and agency is relatively low, and while residents recognise the importance of maintaining drains, many attribute broader responsibility for flood mitigation to government bodies.

Community activities are important... This analysis also revealed a strong propensity for the community to share flood risk information with friends, family and neighbours – an important consideration with direct consequences for Melbourne Water's community focussed strategy.

Communications are vital... This research suggests that the community are largely in the 'not interested' phase, according to the VICSES Community Safety Program for Flood. Most feel there is a low risk of flood in the area, rendering it less important than other threats, and many feel there isn't much they could do to prepare, and imagine having plenty of time to prepare in the event of a flood. There is therefore a need a move residents further along the preparedness chain, and put flood risk and awareness on their agenda to help them prepare.

An analysis - using the Michie COM-B behaviour change framework has shown that communications and marketing are critical tools to be leveraged to increase awareness of flood risk. These should be delivered at a local level, preferably in a way that increases community engagement and visibility to build social norms, and carefully balance fear of consequences and efficacy – a sense that preparation is easy and worthwhile.

Background and methodology

Flood Risk Management in Melbourne

Melbourne Water has several prominent roles including managing water supplies and catchments, supplying drinking and recycled water, treating Melbourne's sewage, and overseeing waterways and drainage systems. In addition to these activities, as the regional Floodplain Manager for Port Phillip and Westernport region, Melbourne Water is also responsible for coordinating flood management.

There are many flood-prone areas within Victoria. While flooding may bring water for wetland ecosystems and replenishing soil moisture and nutrients¹, its negative impacts include significant damages to homes, community infrastructure, local businesses, and agriculture. Melbourne Water has estimated \$735.4million in damages from all forms of flooding across their region. While some of this is inevitable considering the unpredictable nature of Melbourne's weather cycle, rainfall, and river conditions, Melburnians can prepare themselves to avoid devastating damage from floods if they know the warning signs and incorporate flood planning and appropriate actions accordingly. It is estimated that Melbourne has 894,000 properties within flood-prone areas².

Melbourne's current flood warning system is comprised of a range of elements to give flood-prone communities effective riverine warnings. It includes rainfall and streamflow gauging, mapping, warnings, predictions, and community education³. Flood alerting systems in urban areas to cater for flash flooding could help to reduce risks to the flood affected communities.

For several years Melbourne Water has been involved in several initiatives to effectively manage the impacts of flood, including:

- coordinating flood management,
- maintaining the regional drainage network,
- managing infrastructure,
- monitoring flood data, and undertaking modelling and mapping,
- providing flood information and advice,
- developing flash flood alerting systems
- assessing severity of flooding, and
- boosting community preparedness⁴, including flood education and awareness program, to increase awareness and learn to plan for and manage the risk of flood among the communities within the flood-prone areas.

The 'Waterways and Drainage Investment Plan July 2021-June 2026'⁵ mentions several services and programs that Melbourne Water aims to deliver over the next five years, such as stormwater management and flood risk management.

¹ <https://www.floodvictoria.vic.gov.au/>

² Melbourne Water: Research and Innovation Review – Leading Edge Projects 2021

³ <https://www.water.vic.gov.au/managing-floodplains/flood-warning-and-mapping>

⁴ <https://www.melbournewater.com.au/water-data-and-education/water-facts-and-history/flooding>

⁵ Waterways and Drainage Investment Plan Summary July 2021-June 2026

Community Engagement

In 2017, Melbourne Water engaged the University of Melbourne Community Engagement for Disaster Risk Reduction (CEDRR) conducted a flood resilience pilot study in order to gain insights and educate the communities within floodplains.

The pilot study found a significant result in the relationship between household's adoption of initiative and staff visits. The study found this approach also has a ripple effect as the residents decide to share flood preparedness information within their community. Future research into improving flood preparedness programs will require a better understanding of the communities through a social research to evaluate the effectiveness of delivering such community education program and highlight areas for improvement.



Need for Research

The importance of whole-of community engagement in managing flood risks means that the current community education program must be evaluated to monitor and manage its effectiveness in delivering the intended messages. To achieve this, social research is required to scientifically evaluate the impact of flood education and whether it is effective in increasing the levels of awareness and preparedness in flood-prone communities. This research may serve as an opportunity to improve the current program by incorporating and testing evidence-based techniques to see if they are beneficial for the target audience.

Research Objectives

The research objectives for this project are to:

1. Measure and evaluate levels of community flood awareness and preparedness against previous results.
 - How have levels of awareness and preparedness changed since 2018?
 - What flood preparedness actions have been taken and how are these related to perceived preparedness and awareness?
2. Understand whether different flood engagement initiatives and flood information sources contribute to varying levels of community flood awareness and preparedness
 - How have different flood education and engagement programs driven levels of awareness and preparedness (different flood initiatives implemented by VICSES, Melbourne Water and potentially Councils)?
 - How do levels of awareness and preparedness vary geographically across Greater Melbourne?
3. Explore changes to barriers to flood preparedness or factors that contribute to people taking flood preparedness actions
 - Are there barriers to flood preparedness that could be overcome with VICSES and Melbourne Water Flood Education and Awareness programs?
 - What are the critical factors and barriers that lead people to being aware and taking flood preparedness actions?

Methodology

Qualitative phase

An initial qualitative phase was conducted to facilitate in-depth exploration and understanding of flood risk awareness, preparedness, the factors that influence these, flood experience, and responses to communications.

A four-day online forum with n=16 residents of flood prone areas was conducted from May 25 to May 28. The sample included a mix of residents with lower and higher levels of flood risk awareness and preparedness, with users interacting in an open text-based group discussion environment, allowing researchers to observe how the community speak about flood risk and preparedness.

In-depth consultations with n=12 residents of flood prone areas were also conducted. These one-on-one interviews allowed researchers to explore the personal experiences of individuals, and how these inform their flood preparedness.

Figure 1: Qualitative sample frame

Qualitative components	Audience	Sample size (n)
Online Forum 25th – 28th May, 2021 (n=16)	<p>High-risk flood areas. 50:50 mix of those with higher and lower levels of flood risk awareness / preparedness</p> <ul style="list-style-type: none"> 4 people from culturally and linguistically diverse (CALD) backgrounds 3 people with a chronic health issue or permanent disability that affects mobility (in household or person) Mix of household type: 2 x sole occupant, 2 x young children, 2 x older children, 2 x older couple, 2 x shared living Min 1 ATSI <p>Awareness: 50/50 high/low flood risk Preparedness: 50/50 high/low flood preparedness</p>	n=16
Depth Interviews Conducted via Zoom 19th May – 3rd June, 2021 (n=12)	Bayside / Port Phillip	n=2
	Casey / Greater Dandenong	n=2
	Moreland / Maribyrnong	n=2
	Reservoir / Rosanna / Macleod	n=2
	Rosebud / McCrae	n=2
	Glen Eira / Boroondara	n=2
	Awareness: 50/50 high/low flood risk Preparedness: 50/50 high/low flood preparedness	Mixed throughout
<ul style="list-style-type: none"> CALD x 3 Disability x 3 	Mix throughout, not more than one per geographic area	
TOTAL		n=28

Quantitative phase

Following the initial qualitative phase, we conducted a large large-scale online survey of n=1,601 residents of flood prone areas, conducted both online (n=1,051) and via Computer Assisted Telephone Interviews (CATI, n=550). This phase allowed for quantification of the flood risk awareness, preparedness, and the myriad of factors that influence these.

To be eligible to complete the survey, respondents were required to be residents of ABS SA1 areas identified by Melbourne Water as at risk of a 100-year flood event. This is different from previous years of research, where

only residents living in locations directly targeted by SES awareness activities were eligible to complete the survey. Thus, this research provides a much broader view that incorporates all flood prone areas.

Figure 2: Quantitative sample frame

Demographic break		Total sample	Online sample	CATI Sample	Max margin of error (of total sample)
TOTAL		1601	1051	550	2%
Gender	Male	728	470	258	4%
	Female	865	576	289	3%
Age bands	18-34	390	326	64	5%
	35-49	460	328	132	5%
	50+	750	397	353	4%
Other Demographics	Speak language other than English	254	151	103	6%
	Aboriginal and Torres Strait Islander	77	73	4	11%
	Living with disability	166	132	34	8%
SES	High	579	340	239	4%
	Med	273	187	86	6%
	Low	711	486	225	4%



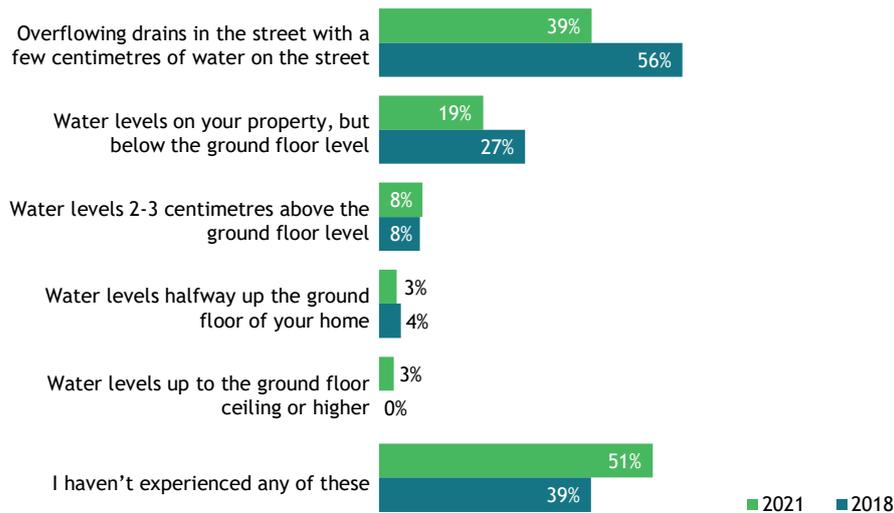
Detailing findings

Flood risk awareness

Residents of flood prone areas are unlikely to perceive of floods as a tangible threat

Around half (49%) of those surveyed in 2021 reported experiencing a flood incident in their home. While four in ten (39%) reported overflowing of street drains resulting in a few centimetres of water in the street, just one quarter (26%) of those in flood affected areas reported flooding that impacted their property (see Figure 3).

Figure 3: Experiences of flood



Source: C7. Which of the following have you ever experienced at your current home or property where you live?
Base: Flood prone; Combined sample: n=1632, 2021: n=1582, 2018: n=50

- Though based on a relatively small sample (n=50), those residing in flood prone areas surveyed in 2018 were more likely to report any kind of flooding (61% compared to 49%). While this result is non-significant, we hypothesise the result would be significant with a larger sample.⁶

Males are more likely than females to report experiencing flood events at their current address (54% compared to 46%).

Given that few residents of flood prone areas have actually experienced any kind of flood event, it's not surprising that concern over flooding ranks relatively low compared with other natural hazards and disasters. As detailed in Figure 4, just one in ten (10%) residents of flood prone areas believe it's likely or extremely likely that their house or property will experience flooding in the next 10 years. People in flood prone areas are far more likely to be concerned with:

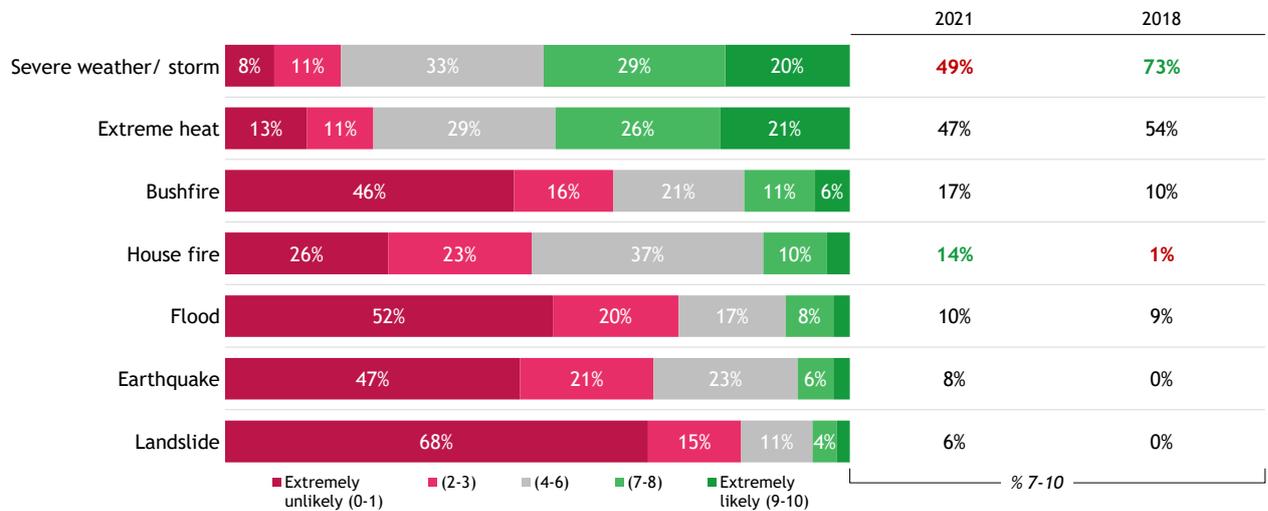
- Severe weather or storms (49%),
- Extreme heat (47%), and
- Bushfires (17%).

Few are concerned with earthquakes or landslides.

⁶ The maximum margin of error on a sample of n=50 is 14%.

- Results are largely consistent with the recording taken in 2018, noting that a spike in concern over extreme weather and storms in 2018 is likely a result of the fatal thunderstorm asthma event that occurred in November 2016.⁷

Figure 4: Perceived likelihood of natural events

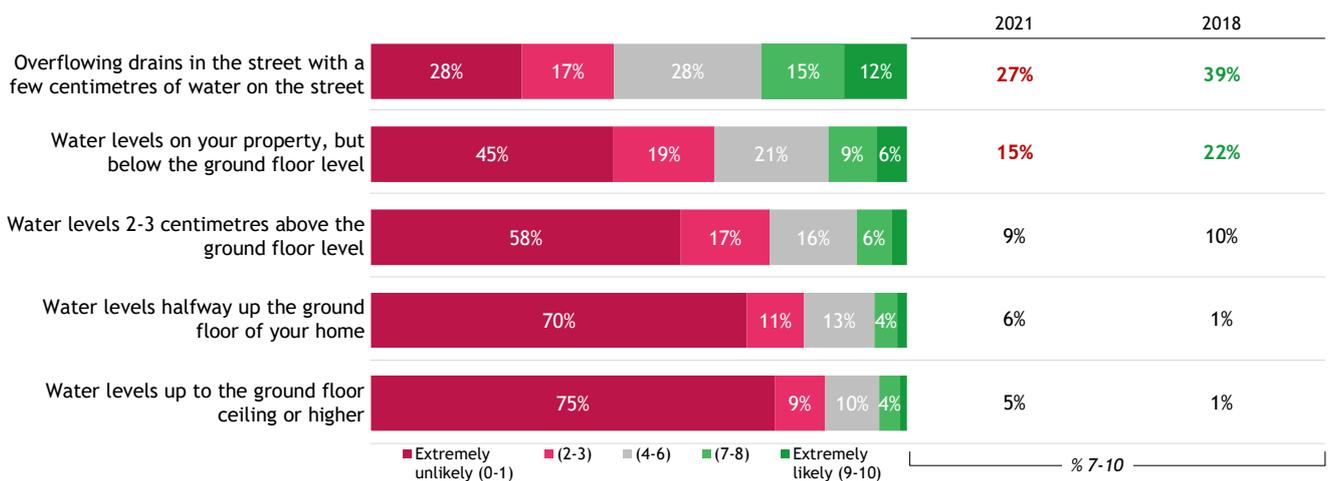


Source: C6. How likely is it that the home or property where you live will experience one of the following emergencies in the next 10 years?
 Base: Flood prone; Combined sample: n=1623, 2021: n=1582, 2018: n=41

This corroborates what we heard during qualitative interviews. Residents of flood prone areas were far more likely to be concerned about the risk of bushfires, extreme heat and severe weather – even when they had no experience with any of these, and even when they had experienced flooding.

Residents with a disability were significantly more likely to consider flood events an extremely likely occurrence over the next 10 years (22% compared to 7%).

Figure 5: Perceived likelihood of flood events



Source: C5. How likely is it that the home or property where you live will experience one of the following flood levels in next 10 years?
 Base: Flood prone; Combined sample: n=1623, 2021: n=1582, 2018: n=41

⁷ <https://www.smh.com.au/lifestyle/thunderstorm-asthma-the-night-a-deadly-storm-took-melbournes-breath-away-20170308-gut8ur.html>



When prompted with specific flood scenarios, residents remained steadfast in their belief in the unlikelihood of these events. Just one in seven (15%) felt that any of the provided scenarios were extremely likely over the next 10 years (see Figure 5).

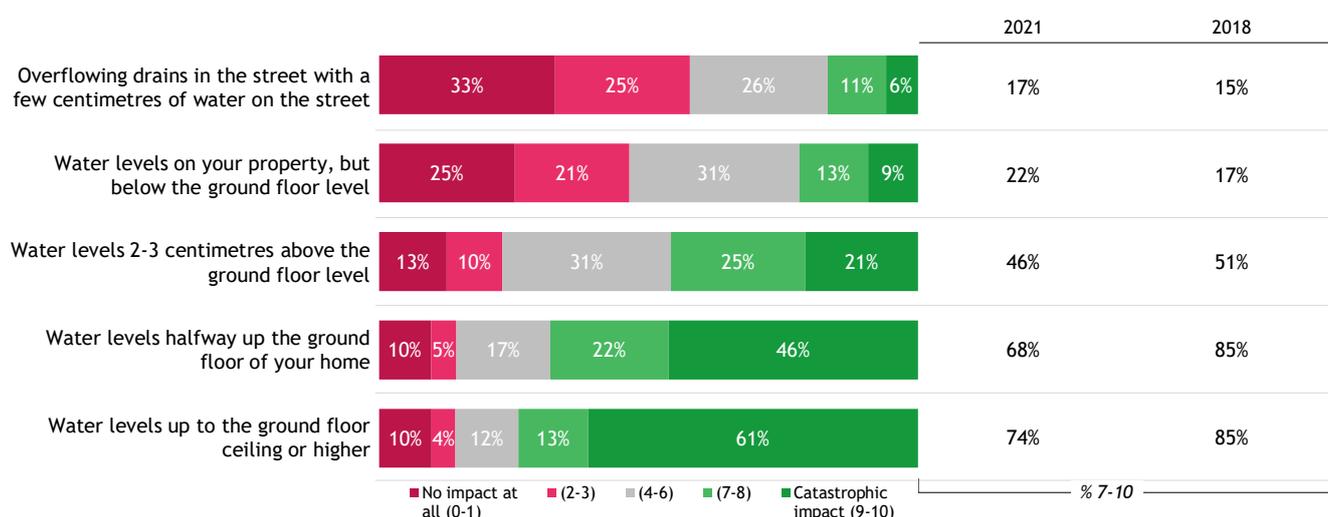
- Though based on a smaller sample size, residents of flood prone regions surveyed in 2018 were twice as likely to feel that any one of these events is extremely likely over the next 10 years (30% compared to 15%).

The perceived consequences and impact of flood events is relatively low compared with 2018 (see Figure 6). Just one in five (21%) residents feel that flood water levels 2-3 centimetres above the ground floor level would have a catastrophic impact – significantly lower than the three in ten (31%) responding in-kind in 2018. Across all listed scenarios, two-thirds (67%) felt that one or more would be catastrophic.

Those more likely to consider any of the mentioned flood events as catastrophic include:

- Residents aged 55+ (76% compared to 62% aged 18-54),
- Females (70% compared to 64% of males),
- Those that own their home outright (72% compared to 64 of other residents), and
- Those in single story houses or townhouses (69% compared to 64% of other residents).

Figure 6: Perceived impact of flood events



Source: E1. We are interested if the impact on you would be different with different levels of flooding. Think about the impact on you, your family, your day-to-day life and your house and contents. Use the scale where 0 is 'no impact at all' to 10 being 'catastrophic impact' to rate the amount of impact for each of the following levels. Firstly... Base: Flood prone; Combined sample: n=1623, 2021: n=1582, 2018: n=41

In qualitative discussions, participants tended to feel the impacts from floods would be minor – even a mere inconvenience. Dealing with the inconvenience and hassle of cleaning up, replacing damaged goods and claiming insurance are known issues, but there was a sense that these can't be significantly managed before an event. Risks to life are perceived to be low, as most feel that a flood is an event they could relatively easily remove themselves and their pets from, and relocating is the main mechanism to keep them safe. Protecting possessions and damage to property is the next most important priority, with many feeling there is little they can really influence.

"I have thought about how likely it is, and if it does happen, whether my stuff is at risk. I've got a rough idea of what to do to protect any electronics."

"Dealing with the inconvenience of cleaning up would be annoying at the time, it could take weeks or months to fully recover, but on the whole it's not really a concern, you'd just deal with it when it comes."

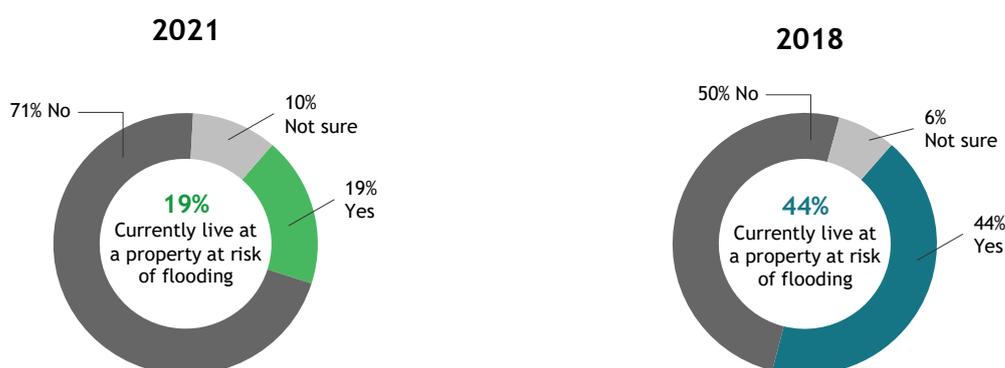


“Threat to damage the floor, walls, furniture and every bit of my house if it gets flooded with water. Threat about not knowing on time to take safety measures. Car damages with water going inside it and its engine. They are very serious in terms of safety of my family. The most dangerous is if we can’t get enough time to prepare to leave and when its sudden.”

Few residents are aware that they live in a flood risk area

Given perceptions around the unlikelihood of flooding, it’s not surprising that few residents - just one in five (19%) - were actually aware that they reside in an area classified as a flood risk. This is much lower than the proportion reported in 2018, where almost half (44%) of residents were aware that they lived in a flood prone area (see Figure 7) – though we note that the 2018 figure is based off just a subset of flood prone communities (i.e., those targeted by SES activities, rather than the broader community).

Figure 7: Awareness of flood risk



Source: C1. To the best of your knowledge, is the home or property where you currently live at risk of flooding or may be affected by flooding? That is, are you in a ‘flood prone’ area?

Base: Flood prone; Combined sample: n=2142, 2021: n=1582, 2018: n=560

Data provided by Melbourne Water indicates that 23,000 households received some form of community engagement from the SES regarding flood risk and flood preparedness from 2017 to 2021. This corresponds to 2.6% of the 894,000 households in SA1 identified as being at risk of a 100-year flood event (though presumably this engagement targeted those at the greatest risk).

Table 1: SES community engagement

	2017-2018	2018-2019	2019-2020	2020-2021 (projected)	Total
Mail out	5246	504	4126	1947	11823
Doorknock	2451	447		1215	4113
Local Flood Guides	6	16	29	14	65
Community activations and meetings	4	1		3	8
Community Events	97	141	87		325
Videos			Approx. 6532 views	5	11 With views - 6543
Total including views:					22,888

NOTE: The community activations and meetings are listed as individual events, these activations take place at larger events like The Royal Melbourne Show and large community events in high exposure locations like Federation Square for example



during Cultural Diversity Week. These events attract tens of thousands of people and VICSES volunteers are highly visible and spend their time engaging with large numbers of community members. We endeavour to have multi lingual volunteers at these activations to maximise our engagement with CALD community members.

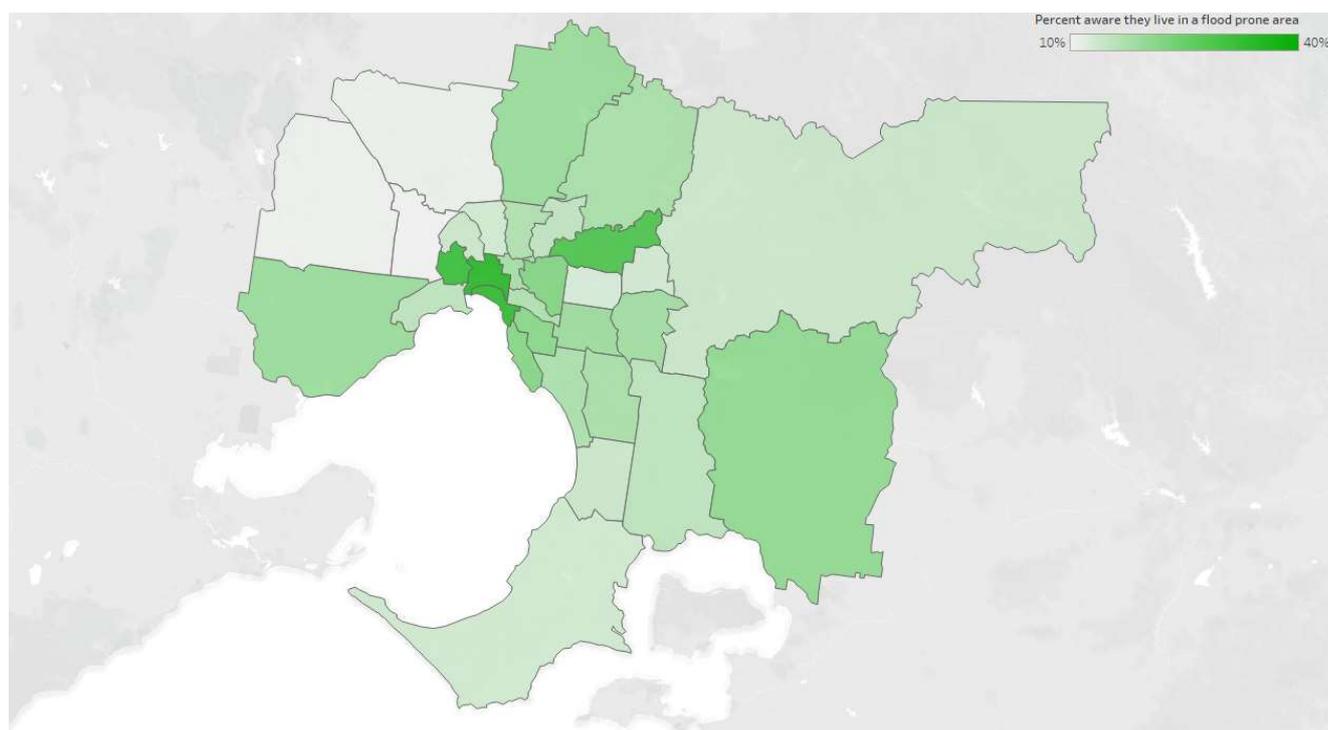
The lower incidence of flood risk awareness substantiates qualitative observations. Very few of the qualitative participants we spoke with were aware that they did indeed live in a flood prone area, despite this being the case. Even among participants who had experienced flood events or had heard of flood events in the area from neighbours, few felt they live in an area which would be classified as a flood risk.

As illustrated in Figure 8, although there was substantial variance across Melbourne LGAs in terms of their level of flood awareness, inner city residents were those most likely to be aware that they lived in a flood prone area, particularly those residing of:

- Melbourne (38%),
- Port Phillip (36%), and
- Maribyrnong (35%).

Manningham residents were also significantly more likely to be aware that that they lived in a flood prone area (32%).

Figure 8: Regional trends in flood awareness



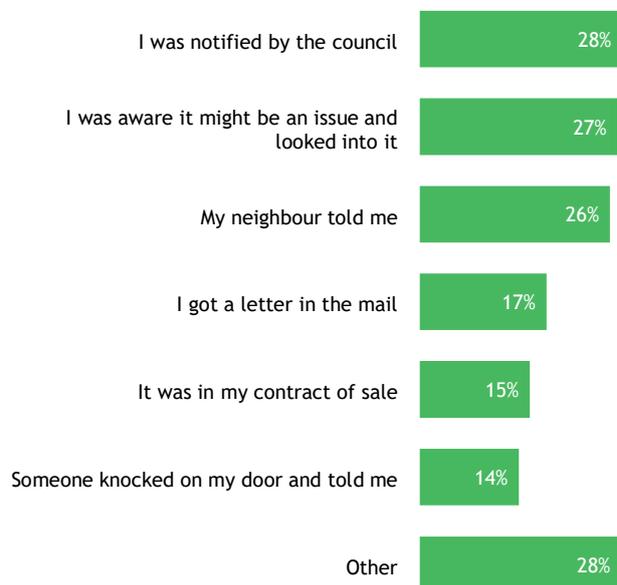
Those more likely to be aware that they live in a flood prone area include:

- Younger residents (27% aged 18-44, compared to 12% of those aged 45+),
- Males (24% compared to 14% of females),
- Those living with a disability (41%, compared to 13% of other residents),
- Those born in Australia (20%, compared to 14% born overseas), and
- Those with children 21 years or younger (26% compared to 14% of other residents).

Experience with flood events is a key determinant of flood risk awareness

Residents aware that they live in a flood prone area attribute this mostly to being notified by the council (28%), being aware it might be an issue and doing some research (27%), or being informed by neighbours (26%, see Figure 9).

Figure 9: Source of flood risk awareness



Source: C2. How did you find out?
Base: Flood prone; Combined sample: n=548, 2021: n=303, 2018: n=245

While these are the information sources that participants mostly attribute to their awareness of local flood risk, analysis suggest that experience of flood is the leading driver of awareness – of those who are aware that they live in a flood prone area, almost three in five (87%) have experienced a flood event at their current address. Conversely, among those who have not experienced a flood at their current address, just one in twenty (5%) were aware they lived in a flood prone area.

This aligns with qualitative interviews, which suggested that awareness of flood risk is primarily driven by personal experience. This includes experiencing a flood event, but also observation of building and infrastructure solutions that have been put in place to mitigate flood risk. Not surprisingly, experiencing regular events drives even higher awareness and causes people to seek knowledge and skills to manage as effectively as possible.

“Due to my location to the creek I’m aware of potential flooding. It has occurred once when water came through my apartment, but this was many years ago. Since that one instance I haven’t had water in my home, but I would also like to know how we could get warnings about upcoming heavy rainfall to adequately prepare.”

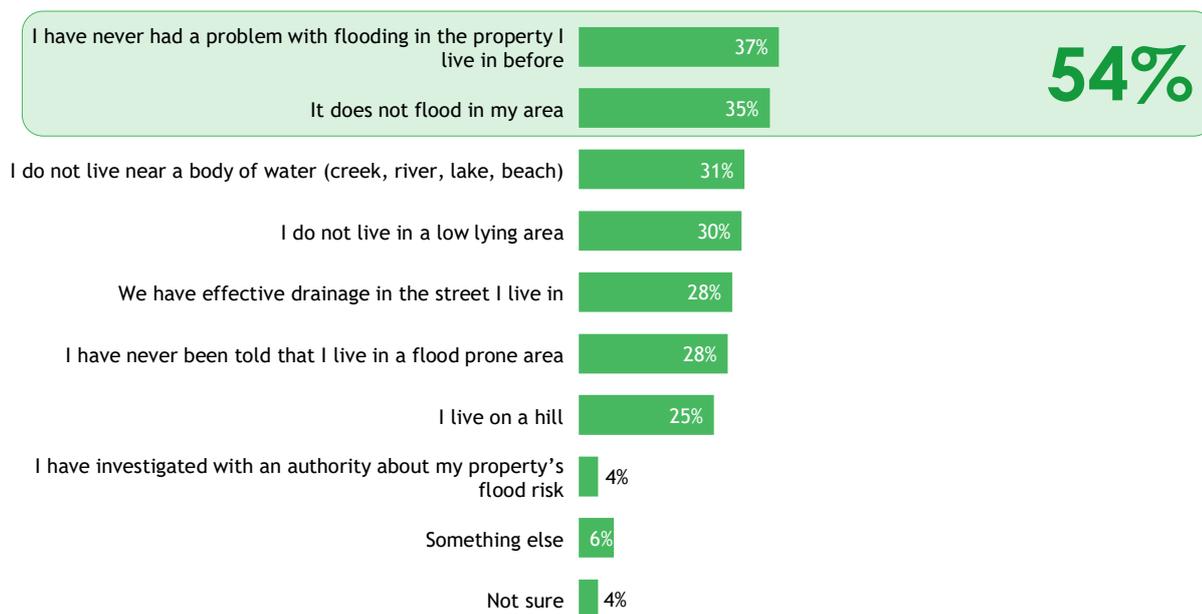
Qualitative interview revealed that among those unaware, nothing in their experience so far had prompted them to consider the risk of flooding. These residents tend to be quite relaxed, feeling that if flood risk was significant they would likely already be aware through personal experience or observation or have been advised by the relevant authority.

“Merri Creek does not seem likely to flood in this area. Haven’t really thought about flooding at all.”

Again, this was validated quantitatively - not having experienced a flood or believing their local area doesn’t flood were the most commonly listed reason for not feeling at flood risk (37% and 35%, respectively). Combined,

more than half (54%) of those who did not believe they were at flood risk listed either of these. A range of other geographic and infrastructural cues are also at play, as detailed in Figure 10.

Figure 10: Reasons for not feeling at risk of flooding



Source: C3. What makes you feel you are not at risk of flooding?
 Base: Flood prone; Combined sample: n=1602.

Flood preparedness

Flood preparedness is low in the community

It's not surprising, given the low levels of concern held by the community with respect to flood events, that few feel sufficiently prepared to deal with flood events – just one in five (18%) felt they were mostly or extremely prepared (Figure 11). Members of the community are far more likely to feel prepared for:

- Extreme heat (51%),
- House fire (37%), and
- Severe weather or storms (36%).

Those who have experienced a flood at their current address were slightly, but significantly, more likely to feel mostly or extremely prepared for a flood (22% compared to 15%). Flood risk awareness had a much stronger association with flood preparedness – of those aware of the flood risk in their area, one third (35%) felt mostly or extremely prepared, compared to just one in six of those unaware of their flood risk (16%).

Other groups more likely to feel flood prepared include:

- Males (24%, compared to 14% of females),
- Those born in Australia (20% compared to 12%),
- Those who own their home outright (23%, compared to 15% of others),

Figure 11: Preparedness for natural events



Source: D2. How prepared do you feel you and your household are for a different type of emergency where you currently live?
 Base: Flood prone; Combined sample: n=1623, 2021: n=1582, 2018: n=41

“I don’t think that you can every really be prepared to a nature event like this, I think that I would just grab my photo albums and the memory cards that I have pics on and go, I suppose you can replace furniture but not your memories.”

During qualitative interviews, flood preparedness was perceived as being important but not urgent. This is related to a belief that flood events have relatively long timeframes, allowing residents to prepare for flood incidents once warned of their imminence. While there was acknowledgment that, in theory, flood water can rise quickly, most felt that they would have sufficient warning to prepare and act. This contrasts with natural disaster like bushfire, which the community are much more concerned about and prepared for, which are known to ravage communities with little warning and opportunity to respond and prepare in-crisis.

“I don’t have much idea about the timeframe in a possible flood. I rely on the information of BOM to plan my job and I would say that they send a 12h warning of severe weather, and I think it is enough to prepare. To leave I would say 2 hours is a safe time to find a safe location.”

“A bushfire is going to get a lot more out of control a lot quicker, with a flood you feel more in control, there’s a lot more you can do.”

Thus, residents felt that materials needed in the moment would be readily available, and that they would have enough time to gather and prepare these in case of a flood emergency. There was a belief that some necessary materials, like sandbags and storage, would be provided by authorities if the need arose (an interesting result given trends in panic-buying in response lockdown measures put in place to manage the COVID-19 pandemic). Most acknowledged that it’s probably ‘a good idea’ to do things like checking insurance and having a supply of bottled water and radio but most don’t consider risk high enough to prioritise.

“I’d assume I’d get an hour or two notice between water rising and between needing to take any significant action like having to leave.”

“I expect that the most likely source of flooding would be massive rainfall, in which case a flood event would happen when all the stormwater and run-off would move downstream. It would have to rain heavily for a couple of days, and maybe within 24 hours you might get consequential flooding, unless there’s some catastrophic failure like a dam breaking or something.”



Nine in ten (89%) residents claim to have taken at least one step to prepare for a natural disaster, including a flood. Having a first aid kit or regular cleaning and maintenance of household drains were relatively commonplace initialises, with half (50%) indicating they had done either of these. Other more common actions are detailed in Figure 12 and Figure 13). Notably, flood-specific initiatives rate relatively low, specifically:

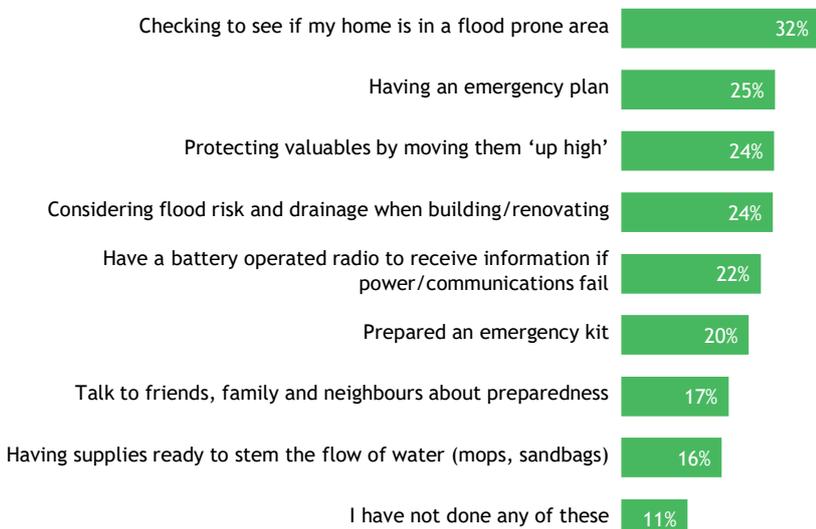
- Reviewing insurance (37%),
- Checking to see if a home is in a flood prone area (32%), and
- Considering flood risk and drainage when building/renovating (24%).

Figure 12: Actions taken to prepare for flood (1 of 2)



Source: D5. Which of the following have you done to minimise the risk and potential damage from a natural disaster, including floods? Have you ever done...
 Base: Flood prone; Combined sample: n=2142, 2021: n=1582, 2018: n=560

Figure 13: Actions taken to prepare for flood (2 of 2)



Source: D5. Which of the following have you done to minimise the risk and potential damage from a natural disaster, including floods? Have you ever done...
 Base: Flood prone; Combined sample: n=2142, 2021: n=1582, 2018: n=560

Qualitatively, people who had previously experienced a flood at their current address were more prepared, and would take early proactive steps to mitigate damage. This aligns with quantitative findings, where those who had experienced a flood were more likely to have taken many of the actions detailed in Figure 12. Interviews with residents who had experienced flooding revealed that regular flooding is actively managed (some even



considering moving home), and that neighbours who have flooded and lost things of value or experienced damage bring the potential of the risk closer to home.

“With our previous near flooding events, I came to realize that water is very strong! The garden was totally rearranged, and the force of the water moved sleepers that were not bolted down.”

“I have made sure that there are no valuables on the ground floor and ensure that they are on the second floor of the home so that they won’t be water damaged. I think in terms of warning I feel that it would be needed anytime due to that we have very random weather and just like that flash flooding can happen anywhere through heaps of rain.”

Despite relatively low levels of flood awareness and preparedness, residents claim relatively high awareness of the steps they could take to prepare for a flood. Those most commonly identified by residents include:

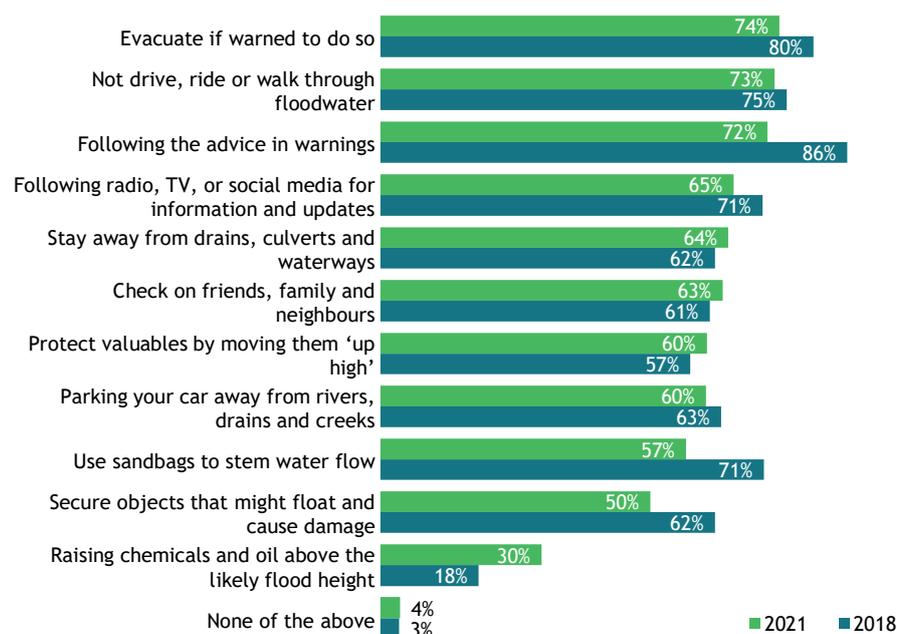
- Evacuating when warned to do so (74%),
- Not moving through floodwater (73%), and
- Following advice or warnings (72%).

As well as being relatively common-sense behaviours in any crisis, these reflect well advertised actions the community is advised to take with respect to natural events they are more prepared and fearful of – i.e., bushfires. However, there is also relatively strong awareness of flood specific actions, including:

- Staying away from drains, culverts and waterways (64%),
- Protecting valuables by moving them up high (60%),
- Parking away from rivers, drains and creeks (60%),
- Using sandbags to stem water flow (57%), and
- Securing objects that might float or cause damage (50%).

Few were aware of the need to raise chemicals and oil above likely flood levels (30%).

Figure 14: Flood preparedness actions



Source: D8. Which of the following actions were you aware of for staying safe during a flood?
 Base: Total Sample, weighted, n=1,601, 2018: Flood prone, weighted, n=560

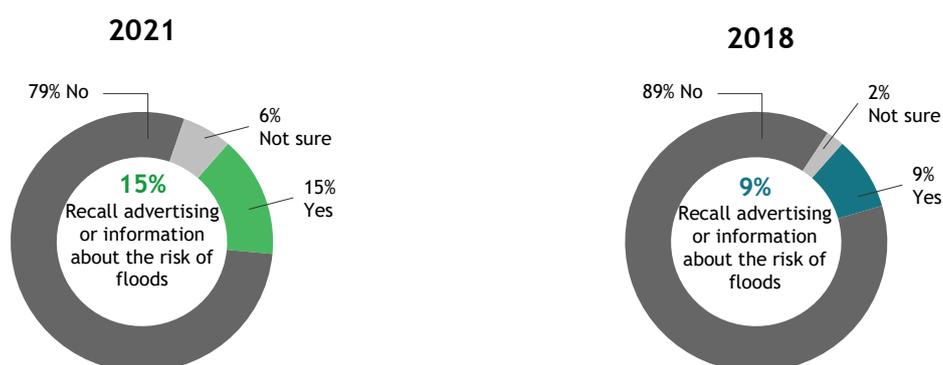


Communications

Awareness of communications

Around one in seven (15%) residents had heard anything about flood risk in the past week – significantly higher than the one in ten (9%) responding in-kind in 2018 (Figure 15). This is likely a result of the timing of the survey, as the later stage of fieldwork was conducted after flood warnings were issued in early June. Analysis of the CATI and online components support this. While the online component of fieldwork was completed before these warnings were raised, most of the CATI component was completed after this. Reflecting this, of those who completed the survey online, just one in ten (9% - on par with 2018) recalled any flood risk information, compared to one quarter (25%) who completed the survey via CATI.

Figure 15: Recall of flood risk information



Source: F1. Do you recall any advertising or information about the risk of floods in the last few weeks?
Base: Flood prone; Combined sample: n=2142, 2021: n=1582, 2018: n=560

Those more likely to recall hearing or seeing flood risk information include:

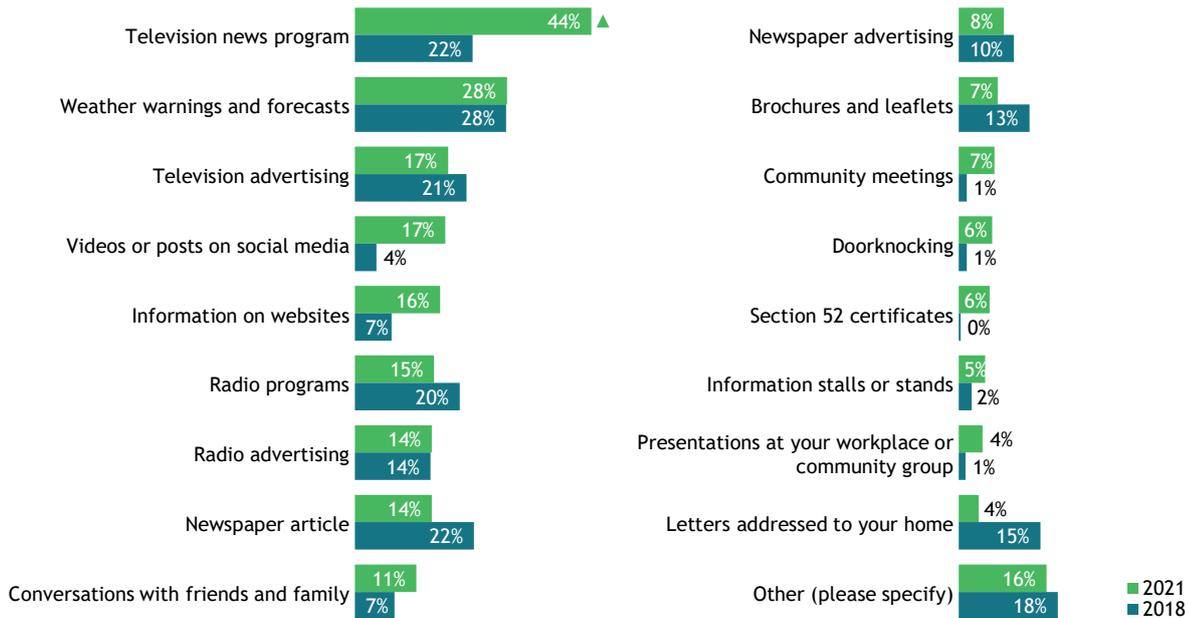
- Those aware they live in a flood prone area (30% compared to 12%),
- Those who have experienced a flood event at their current address (20% compared to 10%),
- Those with a disability (36%, compared to 18%), and
- Those who own their home outright (21%).

Spurred by news reports of potential flooding caused by the severe weather in June 2021, those who had seen any advertising mostly attributed this to television (68%), and most commonly recalled hearing or seeing television news (44%) or weather forecasts and warnings (28%). Three in ten (29%) reported seeing either television, radio, or newspaper advertising.

Information was most commonly reported as being provided by:

- The Bureau of Meteorology (34%),
- The SES (26%), and
- The State Government (19%).

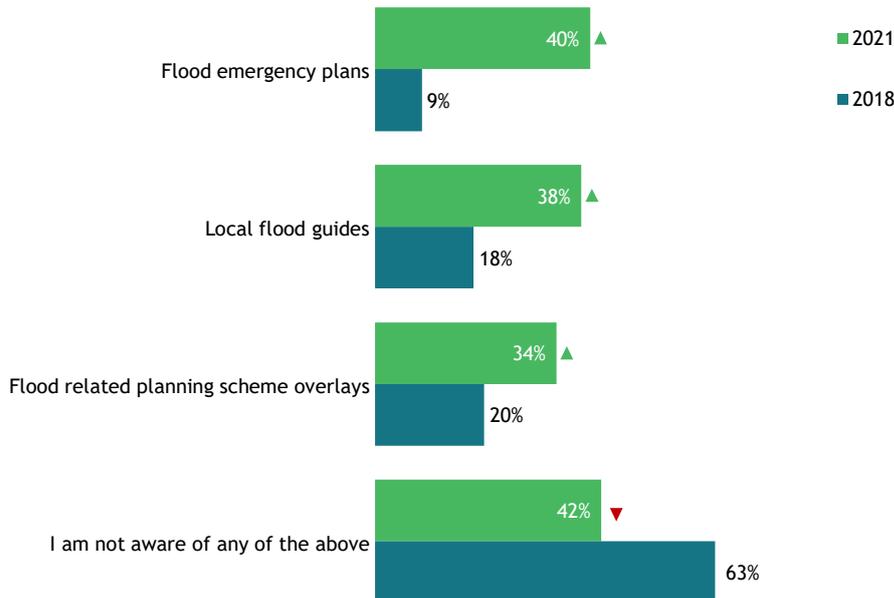
Figure 16: Flood information seen



Source: F3. What specific information have you seen about flooding in the last 12 months?
 Base: Flood prone and saw advertising; Combined: n=303, 2021: n=244, 2019: n=59

There is relatively low awareness in the community of flood information and resources, with four in ten (42%) not aware of flood emergency plans, local flood guides or flood related planning scheme overlays (Figure 17).

Figure 17: Awareness of flood information



Source: F6. Are you aware of any of the following?
 Base: Flood prone and saw advertising; Combined: n=804, 2021: n=244, 2019: n=560

Those more likely to be aware of at least one of these resources include:

- Those who are aware they live in a flood prone area (80% compared to 45%),
- Those who have experienced a flood at their current address (67%, compared to 42%),
- Those living with a disability (70%, compared to 42%),
- Those who were born in Australia (62% compared to 42%),



- Those with children under 21 years (78% compared to 44%).

Response to tested communications

A number of communications approaches were used in the qualitative phase to explore resident reactions to different strategies designed to induce action. Broadly these could be grouped in to ‘fear’ approaches that aim to increase the salience and perceived risk of flood events and ‘efficacy’ approaches that aim to help people prepare for flood. The stimulus shown in our interviews and online forum is presented in the figures below.

Figure 18: Stimulus - fear approaches

Fear approaches

UK – Environment agency
HOME, SWEET HOME?



USA – El Paso water



UK – Environment agency



USA



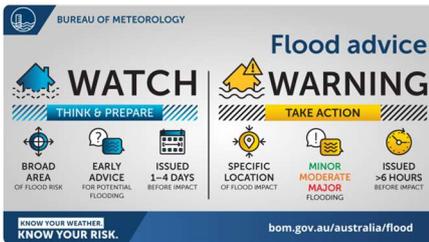
UK – Environment agency



Figure 19: Stimulus - efficacy approaches

Efficacy approaches

Australia - BOM



Australia – SES ‘Bag it, Block it, Leave (video)



UK – Flood Hub



Australia – SES ‘15 to float (video)



UK – Environment agency



Fear approaches

None of the 'fear appeals' were universally effective or resonant. Whilst some executions really connected with some respondents, they were ridiculed and dismissed by others. Reasons for rejection underlined how responses to threats can be used to minimise the perception of susceptibility by focussing on reasons why this is unlikely to 'apply to me'. They included:

- Being overly dramatic
- Being unrealistic and not relevant
- Being too scary
- Too simplistic i.e. tells you what to do without providing context
- All 'Fear appeals' should provide a call to action. It was felt by respondents to be a wasted opportunity to get their attention and not give them advice or a source for finding more information
- However the executions that did NOT leverage fear as an emotional engagement mechanism were felt to gloss over the potential trauma of a flood event and in some cases to trivialise it.

Threat to damage the floor, walls, furniture and every bit of my house if it get flooded with water. Threat about not knowing on time to take safety measures. Car damages with water going inside it and its engine. They are very serious in terms of safety of my family. The most dangerous is if we cant get enough time to prepare to leave and when its sudden.

'Efficacy' approaches

A range of 'efficacy approaches were also tested in the qualitative phase. Advertisements that articulated simple, clear steps were the most effective of these. Too much information that is not relevant in the moment is quickly dismissed, with the assumption that it can be sourced closer to when it is required. For example:

- The Australian Bureau of Meteorology's approach (top left of the 'efficacy' approaches) took too long for people to decode – the messages were lost to confusion about what the communication was trying to get across.
- In contrast, the UK Environmental Agency's approach was much clearer and easier for people to interpret. The actions align neatly with the warning level, and the simple Prepare Act Survive imperative came across strongly.

New information is compelling and provides a strong hook for engagement. Facts that stood out here were:

- 15cm to float from the Victorian SES video was surprising and new information to everyone across our sample.
- The 'Bag it, Block it, Lift It and Leave' ad from the Victorian SES illustrating blocking drains as a protective measure. This execution also achieved strong cut-through and high message retention. Its catchy tune, clear messages and new information were compelling for many, despite it being perceived as quite a child-like execution. For some, its cheerful tone was at odds with the seriousness of the message but it was recognised that if aimed at children that action could be encouraged without scare tactics.

In line with broader behavioural change theory, the most successful executions combined both the fear appeal and information elements. Two executions that achieved this most successfully were the UK 'Prepare. Act. Survive' and the '15 to Float'. They both:

- Came across as serious but not unnecessarily dramatic

- Provided a clear call to action
- Provided new information

Beliefs and attitudes to flood risk

Beliefs and attitudes toward flood risk measured in this research fall under four broad categories:

- **Prepared** refers to the extent to which people feel able to, and have, prepared for a flood event.
- **Community preparedness** refers to the extent that people feel the local community should be involved in preparing for flood, and also the extent to which people feel a community is sufficiently prepared.
- **Externalising responsibility** describes the extent people feel an official body are responsible for flood preparedness.
- **Apathy** is present in those who feel not much could be done to prepare for flood events.

Prepared

As detailed in Figure 20 and Figure 21, less than half of residents agree with any of the prepared measures, with large proportions (between 29% and 41%) expressing neutrality on statements. Residents agree that protecting their property is their responsibility (45%) - however, agreement in the confidence of their actions decreased 10-points (to 35%). While three in ten agree there are lots of things that can be done to prepare for a flood, around the same proportion agree they have done all that they can to prepare.

Figure 20: Prepared (1 of 2)



Source: D4. The following are some statements that people have said about flooding in Melbourne. For each one, please indicate how strongly you agree or disagree with the statement, on a scale from 0 to 10 where 0 is strongly disagree and 10 is strongly agree.
 Base: Flood prone; Combined sample: n=2142, 2021: n=1582, 2018: n=560

A little over one quarter (27%) agree that they feel well prepared for a flood, or that they know how to protect their property from flood – while over a third (37%) disagree that they are well-prepared.

The pattern of these responses makes it clear that although people are willing to take responsibility for protecting their property, few feel equipped to do this well and with confidence.

- Since 2018, residents have become less confident in their actions, decrease 10-points.



Figure 21: Prepared (2 of 2)



Source: D4. The following are some statements that people have said about flooding in Melbourne. For each one, please indicate how strongly you agree or disagree with the statement, on a scale from 0 to 10 where 0 is strongly disagree and 10 is strongly agree.
 Base: Flood prone; Combined sample: n=2142, 2021: n=1582, 2018: n=560

Residents aware that they live in a flood prone area are more likely to agree that:

- There are lots of things I can do to minimise the potential damage from a flood (41% compared to 28%),
- I have done all that I can to prepare my home for a flood (41% compared to 29%),
- There are lots of things I can do to minimise the risk of flooding to my home (37% compared to 27%), and
- I know what to do to protect my property if there is a flood (35% compared to 35%).

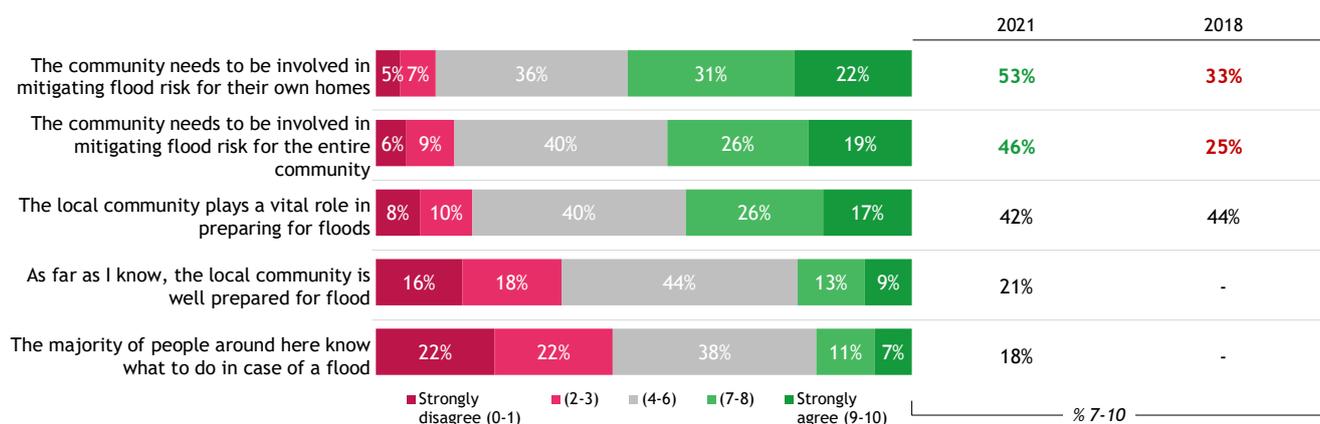
Those who have experienced a flood at their current address are more likely to agree that:

- There are lots of things I can do to minimise the potential damage from a flood (35% compared to 25%), and
- There are lots of things I can do to minimise the risk of flooding to my home (33% compared to 25%).

Community preparedness

Around half (53%) of residents agree that the community need to be involved in mitigating flood risk for their own home, and slightly less (46%) agree the community should be involved in mitigating risk to the broader community (Figure 22).

Figure 22: Community preparedness



Source: D4. The following are some statements that people have said about flooding in Melbourne. For each one, please indicate how strongly you agree or disagree with the statement, on a scale from 0 to 10 where 0 is strongly disagree and 10 is strongly agree.
 Base: Flood prone; Combined sample: n=2142, 2021: n=1582, 2018: n=560

However, very few agree that the community is well prepared for flood events (21%), or that the majority of people in the community would know what to do in case of a flood. This pattern of responses aligns with what



can be observed with respect to the *prepared* factor – although people acknowledge their own and the community’s responsibility, few feel that they, or the broader community, are sufficiently prepared to respond to floods.

Residents aware that they live in a flood prone area were more likely to agree that:

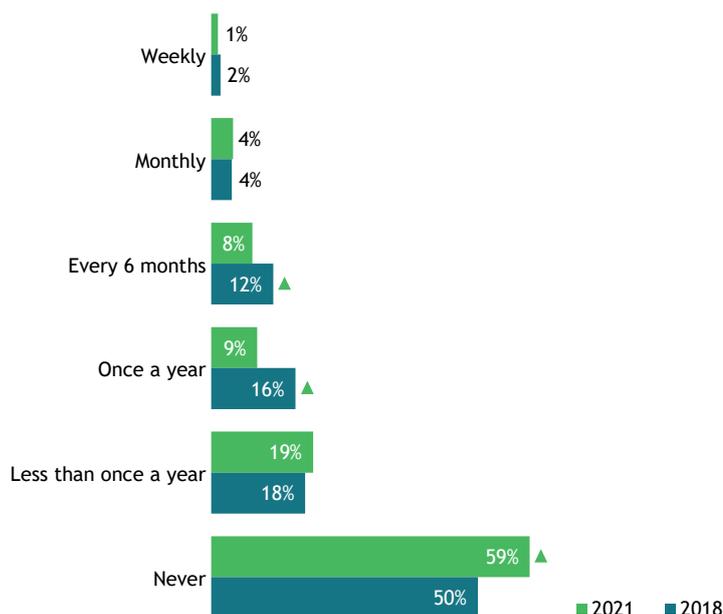
- The local community is well prepared for flood (29% compared to 20%), and
- The people around them know what to do in case of a flood (29% compared to 15%).

Those who have experienced a flood at their current address were more likely to agree that the community needs to be involved in mitigating flood risk for their own homes (57% compared to 49%).

- Resident’s sense of the shared responsibility of mitigating flood risk to homes (from 33% to 53%) and the community (25% to 46%) has increased since 2018. This may be an effect of the COVID-19 pandemic, which saw local communities, restricted in their movements, form stronger local bonds and an improved sense of community.

Six in ten (59%) of residents had never spoken with family, friends or neighbours about the flood risk in their area – a significant increase from the half (50%) reported in 2018. Residents aware that they live in a flood prone area were far more likely to have discussed flood risk with the community (79% compared to 32% who are unaware). This is a very encouraging result which points to the opportunity for natural amplification of flood risk messaging - driving awareness of flood risk will likely have exponential returns, as the community are likely to naturally share and multiply this information among the community.

Figure 23: Speaking with the community

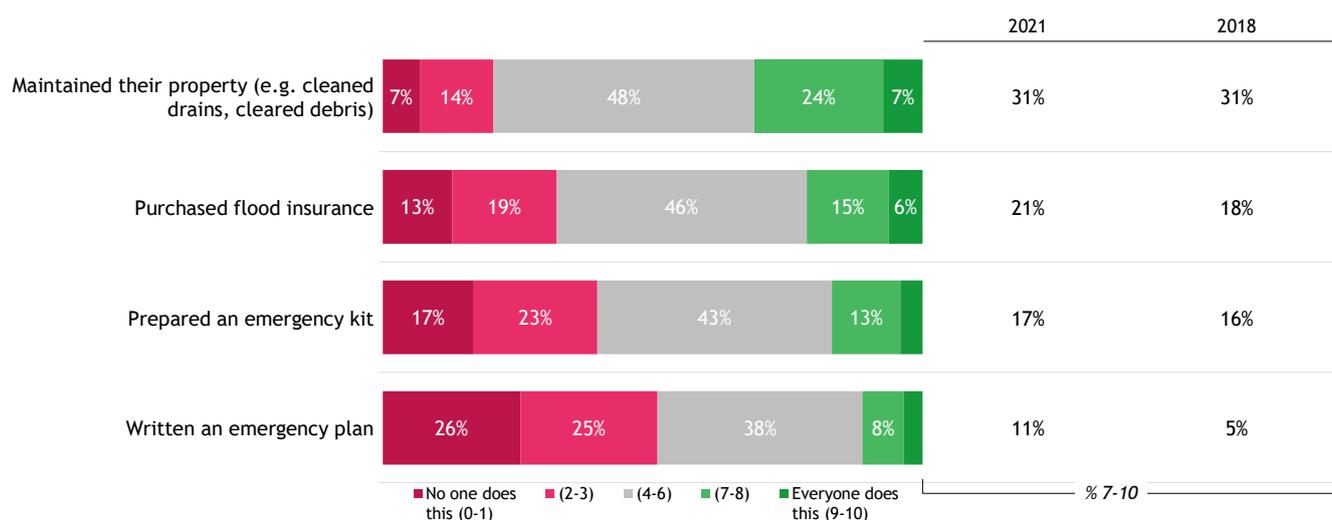


Source: D9. How often do you discuss the potential for flooding in your area with family, friends or neighbours? Is it...?
 Base: Flood prone; Combined sample: n=2142, 2021: n=1582, 2018: n=560

Thinking beyond the local community to the wider Melbourne population, three in ten (31%) residents feel that Melburnians have prepared for flood by maintaining property by cleaning drains and clearing debris. There is a sense that fewer people in the broader community would have purchased flood insurance (21%), prepared and emergency kit (17%), or written an emergency plan (11%).



Figure 24: Preparedness beyond the community

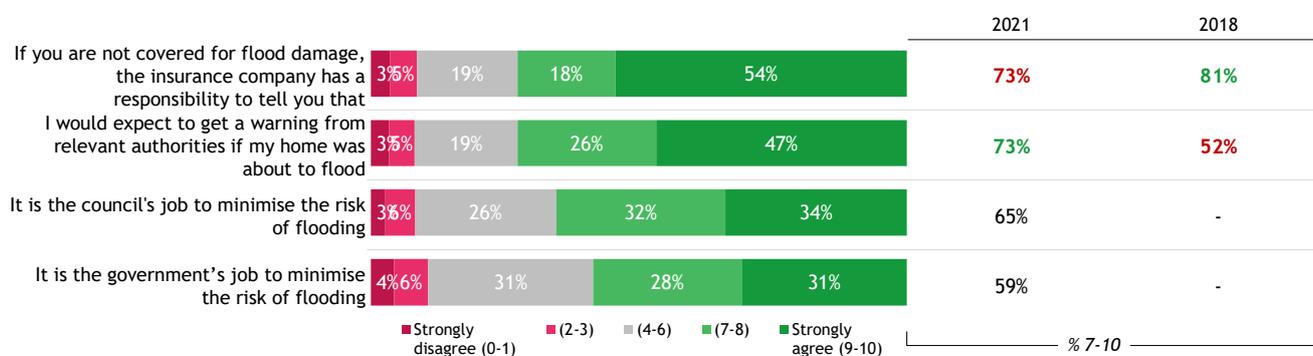


Source: D10. Do you think Melburnians have taken the following protective actions?
 Base: Flood prone; Combined sample: n=1623, 2021: n=1582, 2018: n=41

Externalising responsibility

Residents tend to agree that third parties, including insurance companies and government should be involved in helping people prepare for flood. In particular, residents agreed that insurance companies have a responsibility to inform the community if they are not covered. When asked simply if the government have an obligation to inform communities about flood risk and only the opportunity to provide a yes, no or don't know response, a near-ubiquitous majority (91%) agree (only 5% disagree, with the remaining 4% being unsure).

Figure 25: Externalising responsibility



Source: D4. The following are some statements that people have said about flooding in Melbourne. For each one, please indicate how strongly you agree or disagree with the statement, on a scale from 0 to 10 where 0 is strongly disagree and 10 is strongly agree.
 Base: Flood prone; Combined sample: n=2142, 2021: n=1582, 2018: n=560

This reflects a sense in the community – uncovered in qualitative interviews – that personal responsibility and sense of agency tend to be relatively limited. Beyond clearing debris around property and meeting design regulations in renovations and extensions, most don't see flood risk mitigation as their responsibility, and believed that there was little they could do. Interestingly, many related having experienced some flooding event in the past but not recently, an experience that gives rise to perceptions that improvements to infrastructure and advancements in engineering and technology have reduced flood risk.

Accordingly, the main factors that can mitigate flood risk are perceived to be infrastructure and water management. There is clear trust and expectation in these agencies to successfully manage the situation to protect them. Unfortunately, this removes the burden from individuals, and while some home owners in flood-

prone areas have constructed houses and gardens to mitigate flood damage, many believe that their ability to influence flood outcomes in a meaningful way is limited.

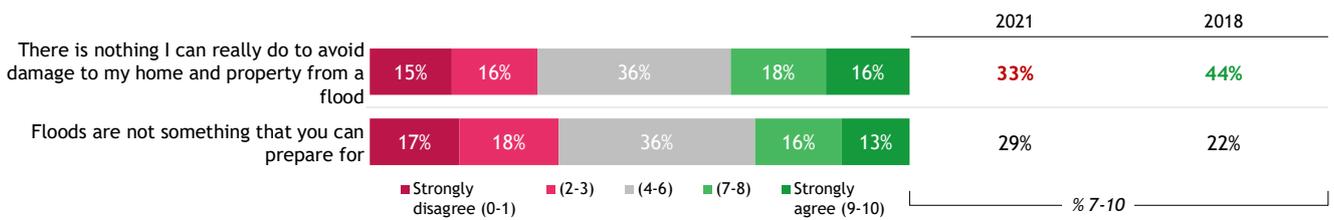
“I don’t really see that there is much I could really do, like I can keep my gutters clean but I can’t build a moat around my house or anything. It’s pretty unlikely but if it did happen there is probably nothing anyone could do, and you’d just have to deal with it.”

“After moving, these lessons were put into action. and the water diverts down the side of the house, Wire fences to keep the pets in, as opposed to paling fences. Little material is left lying around to be washed along and cause damage. The driveway is the natural escape route of the water, and it is concrete. So far only once has the back porch become flooded, it but it was the amount of rain we received in a short time. It drained away in minutes.”

Apathy

Given that individuals feel little responsibility or agency with respect to flood risk, it is not surprising that apathy is relatively commonplace. One-third (33%) agree that there is nothing they can really do to avoid damage to their home, and a little less agree that floods are not something you can prepare for. Perhaps surprisingly, apathy correlates positively with awareness of flood risk – those aware that they live in a flood prone area were more likely to agree with both statements detailed in Figure 26.

Figure 26: Apathy factor



Behavioural change analysis

VicSES Preparedness Chain

It appears that the community are largely in the ‘not interested’ phase according to the VICSES Community Safety Program for Flood (Figure 27). Most feel there is a very low risk of flood in their area – despite the survey and qualitative research focussing exclusively on areas at risk. Most don’t feel there is much they can do to prepare, and don’t feel they need to – they will get plenty of warning to be able to escape, and don’t believe that they can really make a difference by being prepared anyway.

This means there is a need to move them along the preparedness chain – even thinking about flood will ensure that they are more prepared.



Figure 27: From the VICSES Community Safety Program for Flood October 2020



Figure 3: VICSES preparedness chain

Behavioural change approaches for flood prone residents

For this analysis, we have used the Michie COM-B model. This model combines 80+ models of behavioural change to identify all the way in which a behaviours can be 'nudged'. The central tenet of the Michie COM-B model is that for a behaviour change to occur, people require the Capability, Opportunity and Motivation to do so. Our analysis is therefore structured around these dimensions.

Capability

Psychological Capability: *refers to knowledge, memory, attention, decision processes, behavioural regulation. People need to have the psychological capability to create actions*

Increase awareness. There is a clear need to increase awareness of flood risk around flood prone areas. Residents who are aware of their risk are far more likely to have discussed it with their neighbours and the local community. While the approach of door-knocking using SES volunteers doubtlessly has a strong effect when they are able to meet with residents, it is likely that this approach is resource intensive and given the approach of not visiting on weekends, or public holidays, quite limited in reach. Some suggestions for increasing awareness that take a more behavioural lens include:

- **Creating a framework of understanding about level of risk.** If people correctly understand their level of risk and trust the assessment, they are more likely to take being at a higher risk seriously and adapt behaviour accordingly. They are therefore less likely to be able to adopt a stance that flooding is unlikely to happen to them and comfortably ignore communication and calls to be prepared
- **Balancing fear and efficacy** – the research results suggest that the approaches designed to induce outright fear are problematic – they tend to be dismissed as unbelievable and lacking in credibility. Instead we suggest that communications should connect with a desire to protect the things that are most important to them, including a wider responsibility for their community, as well as the motivation to avoid the time, cost,

energy and stress that would follow losses from a flood. Communications should include a straightforward and low friction call to action that enables residents to implement protective behaviour and mitigate the fears that have been triggered

It was also noted that many of the current information channels have several layers, many of them technical, that require navigation through to be able to find geographically relevant information. People want to know if they need to pay attention to this issue. Generalised information can be easy to ignore under the assumption, or hope, that this doesn't apply to them.

- **Create triggers.** Similar to bushfire 'Watch and Act' – clear stages with triggers of what to do when. For example if floods are more likely to happen in winter when it rains more, a seasonal campaign in Autumn asking people to prepare for the risk of localised flooding over the coming months could create a good trigger event that signals the need for early preparation.
- **Idea of preparedness being a stress avoidance mechanism.** Natural disasters in the recent experience including the 19/20 bushfires and the flooding in NSW and QLD, and the current experience of living with a global pandemic have highlighted the high potential for adverse mental health impacts of external stressors. There is correspondingly a greater awareness and importance of maintaining resilience and mitigating mental health issues – i.e. flood preparedness is an important investment in future you and your community. Communications can recognise this dynamic and relate to a desire to avoid psychological stress and future trauma.

We anticipate that Australians living in areas affected by the current New South Wales and Queensland floods are likely to experience psychological distress. While some level of distress is a normal and understandable response to these events, we know from previous disasters that for many this may lead to more chronic mental health problems.

Mental Health Impacts of Floods. Black Dog Institute, March 2021

Opportunity

Physical Opportunity: *refers to the environmental context and resources available to help support the actions they need to take.*

To be physically prepared, residents need to have the tools, information and skills they need to make the necessary preparations. The research shows that few residents in flood-risk areas feel well-prepared for a flood – it's simply something that most have not thought of. Interestingly, a greater proportion of residents know that information like flood plans is available, but they are not likely to have reviewed them or paid any attention to them.

- **Information-seeking:** the research suggests that most people assume that threat is low and the effects are unlikely to be severe and most people probably won't go looking for information on how to prepare for floods. These assumptions can be strategically challenged, a course of action that could be particularly effective if the highest risk households were specifically targeted.
- Low engagement and awareness indicates that a 'push' communications strategy will be most useful to put information front of them in a way that is likely to induce them to review and incorporate actions. This should include:
- Content delivered directly to residents who live in flood-prone areas e.g. letterbox drop, council endorsed, hyper local communications on social media
- Knowledge of what physical resources could be required and where they will be available, and how to access. (e.g. sandbag distribution and accessibility)

- Knowledge on how to execute (e.g. emergency bag, download an app, fill a sandbag)
- **Undertaking planning:** although planning is likely to involve high levels of effort, time and energy and potentially cost, there are ways in which these barriers can be lowered. This could be achieved by:
 - Having a standard planning checklist of things to do or look out for that is distributed to every home in flood prone areas
 - Piggybacking on other plans – making it simple and quick e.g. including more items to transform a ‘bushfire plan’ into an ‘emergency plan’
- **Identifying triggers:** What to watch for, timeline of when to act, what to do. What are local cues? Sign-posting them
- **Warning System:** What to expect when and what’s required of me. This was used in the most effective of the advertisement shown to people – the UK Environmental agency’s Prepare, Act Survive advertisement.

Social Opportunity

Social influences such as social pressure, norms, conformity, social comparisons have a huge impact on our behaviours, and are potentially under-leveraged in the current strategy.

- Signalling of how local communities in flood-prone areas are actively responding to flood risk builds awareness and expectation of engagement. Hyperlocal examples of preparedness, communicated through local media can be effective, as well as identification of high risk areas and explanation of appropriate actions within a local context, for example where sandbags would be available. These could include emotional stories of how preparedness has helped avoid disaster.
- Having and sharing the Vic Emergency app. Promoting as an important tool in general, not just for flood prone areas
- Notices in local public and community areas, e.g local parks that are subject to flood that reference how residents can prepare and where to go for information. Information in public gathering spots can help induce community conversations

Motivation

Reflective motivation: *refers to people’s beliefs about capabilities and consequences, roles, identity, intentions, goals, optimism about the future.*

It is not currently straightforward to discover if you live in a flood-prone area. The logical first step for most people is to Google a question such as “do I live in a flood zone?” or “is my house at risk from flood?”. The results of a search such as this leave it unclear as to who are the most credible authorities and contribute to a perception that becoming informed about this will require an investment in time and energy. Although it is possible to find the answer, there are several steps to navigate through, often including a series of links, different information sources and technical information that requires specific knowledge to decode and extrapolate the significance and implications for the individual resident. The research also confirmed that people are more likely to take actions that are anticipated to be low cost, effort and time.

To increase motivation we recommend:

- **Creating an identity that as a resident you are ‘high’, ‘medium’ or ‘low/no’ flood risk.** Explicit recognition that some residents are at higher risk than others acknowledges the broad community understanding that not all residents, even those who are close neighbours, have the same level of flood risk and therefore the same requirement for preparedness. Personalising the level of risk, especially through a self-directed ‘pull’ activity is likely to increase engagement and motivation to take action. This could be achieved by:

- Building a channel that enables people to find out if their home is in a flood-prone area. i.e. input your address and receive immediate feedback on your home's status, similar to the 'how far is 5km radius during COVID restrictions too'.
- **Providing personalised advice.** Based on address and corresponding risk-status, provide specific advice about recommended actions.
- **Increasing perception of impact of negative consequences** - be specific about amounts of loss, what insurance doesn't cover, how much time, stress and energy go into flood cleanup.
- Focus on what you can't afford to lose. Many people volunteered the impact of losing photographs and other irreplaceable items. These findings agree with previous research and recommendations that a powerful emotional hook is to connect with what identity you could lose in flood and the high cost of that. A creative approach of asking *"What would you save?"* could be an effective way of triggering this emotional connection.
- **Raising confidence that their individual actions can have a positive effect** *"I'm confident that I am able to take the actions required to prepare my property for a flood"*. Presenting actions as easily achievable and that many other people have adopted increases perception that residents have some agency in being able to influence outcomes, not just that they are physically / mentally capable.
- **Social demonstration via examples that individual actions can and will make a difference.** This helps address the perception that *"nothing I can realistically do will have much impact"*
- **For everyone, strategically promote low barrier / effort actions which are more likely to be executed** Encourage participation and engagement with low friction, quick wins. Taking small steps towards preparedness positively influences receptiveness to future messages.
- Checking if you live in a flood-prone area. Make this first essential action easy and straightforward, with accompanying information about what you should do in each case and how to do it
- Buying a document storage box protecting from fire / flood. What are the criteria to look for? Where are they available?
- Questions to ask your insurance company, such as where to look in a contract; what to expect; what to ask

Automatic Motivation: *Emotions, reinforcement such as rewards, incentives, punishment create automatic motivation.*

For most the fear of flood is the primary way to increase automatic motivation however this risks not connecting if there is no foundational belief that 'it could be me'.

- Demonstration of consequences (specifically time, cost, effort, emotional toll) if no action taken
- Leverage positive feeling of 'being on top of it'. Ticking off the first step of 'checking' if your risk level could feel like a low effort positive first step towards flood awareness and preparedness

A range of behavioural change approaches are likely appropriate for encouraging residents to better prepare for flood risks. This project has sought to identify the best strategies to encourage people to prepare for potential flood events based on the qualitative and quantitative data.

Melbourne Water 'Preparedness' model

Identifying the key determinants of actions to minimise the risk of flooding and its potential damage

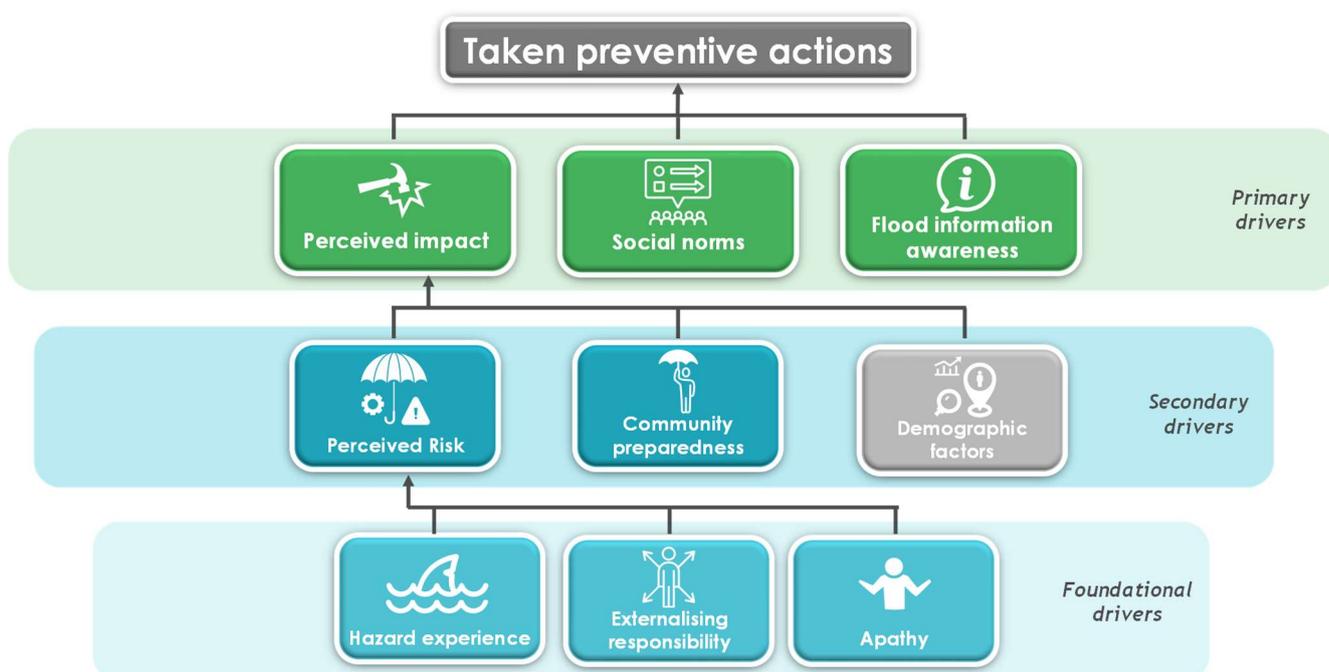
The Melbourne Water 'Flood Preparedness' model is a statistical model derived from the Protective Action Decision Model (PADM) - a well-recognised model that describes individual's responses to environmental

hazards and disasters. While the Melbourne Water 'Flood Preparedness' model is conceptually based on and broadly aligns with the PADM's, it has been fine-tuned to make the model specific to flood risk management and preparedness.

The model combines 48 different questions and variables from the survey that have been simplified into 10 factors:

- Taken preventive actions
- Perceived impact
- Social norms
- Flood information awareness
- Community preparedness
- Externalising responsibility
- Perceived risk
- Apathy
- Hazard experience
- Demographic factors (including age, gender, and ethnicity)

Figure 28: Melbourne Water Flood Preparedness Model



Taken preventive actions is the outcome factor – that is the dimension which is ultimately influenced by the 9 other factors in the model. It describes the extent to which an individual has taken actions to minimise the risk and potential damage from flood events. These actions include (but are not limited to):

- Identifying an alternative place to stay if you have to evacuate
- Regular cleaning and maintenance of drains on homes
- Have backups of important documents and data
- Checking to see if my home is in a flood prone area
- Ensuring there is sufficient drainage on my home
- Considering flood risk and drainage when building/renovating.



Residents that score highly on this dimension are more likely to have taken any of the actions above (and other actions to minimise the risk and damage of floods). As seen in Figure 28, these actions are driven by three direct drivers, three secondary drivers, and three indirect drivers.

Direct drivers

The three direct drivers of **Taken preventive actions** are **Perceived impact**, **Social norms**, and **Flood information awareness**

<p>Social norms</p>	<p>Relates to shared expectations of behaviour relating flood preparedness and taking protective actions. These norms include Melbournians’ belief that their fellow neighbours have:</p> <ul style="list-style-type: none"> • Purchased flood insurance • Maintained their property such as cleaning drains and clearing debris • Writing an emergency plan • Preparing an emergency kit <p>Melbournians scoring high on this factor are more susceptible to these social cues and norms shaping their decision-making process and thus, taking more protection actions against floods.</p>
<p>Flood information awareness</p>	<p>Relate to Melbournians’ recollection of flood related advertising or information. Melbournians that score high on this factor are more likely to engage in flood-related protective behaviours and actions as a result of these information sources.</p>
<p>Perceived impact</p>	<p>Relates to beliefs about the level of impact that flooding would have on Melbournians, including their family, day-to-day life and their belongings. This factor consists of the different levels of flooding including:</p> <ul style="list-style-type: none"> • Water levels 2-3 centimetres above the ground floor level • Water levels halfway up the ground floor of your home • Water levels up to the ground floor ceiling or higher <p>Those scoring high on this factor are more likely to think any of the above flood-related scenarios would have a greater impact on them.</p>

Secondary drivers

The second tier of drivers comprises three essential dimensions that underpin Melbournians’ perceived impact of flood; these dimensions are **Perceived risk**, **Community preparedness**, and **Demographic factors**

<p>Perceived risk</p>	<p>Relates to Melbournians’ perceived likelihood of experiencing a flood in the next ten years. This factor also encompasses whether Melbournians are aware that they are living in a flood prone area. Finally, this factor also includes Melbournians’ perceived likelihood of experiencing one of the following flood levels in the next 10 years:</p> <ul style="list-style-type: none"> • Water levels 2-3 centimetres above the ground floor level • Water levels halfway up the ground floor of your home • Water levels up to the ground floor ceiling or higher
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	Melburnians scoring high on this factor are more likely to think they are at greater risk of flood and aware that they live in an area that is prone to flooding.
Community preparedness	<p>Relate to key attitudes held by Melburnians in relation to how prepared their community is and the level of involvement needed. This factor consists of differing levels of agreement to the following statements:</p> <ul style="list-style-type: none"> • The community needs to be involved in mitigating flood risk for their own homes • The community needs to be involved in mitigating flood risk for the entire community • The local community plays a vital role in preparing for floods • As far as I know, the local community is well prepared for flood • The majority of people around here know what to do in case of a flood. <p>In contrast to Perceived risk, Melburnians that score high on this factor are more likely to have a deflated view regarding the level of impact that flooding would have, which in turn will make them less likely to engage in taking preventive actions.</p>
Demographics	<p>Modelling showed that two demographic factors – age and cultural background have a significant effect on the level of preparedness of flood-risk. Those over 40 years of age tend to be better prepared for flood, while those who speak a language other than English at home tend to be less well prepared. This has implications for communications, suggesting that:</p> <ul style="list-style-type: none"> • Messaging that is designed for younger people (under age 40) may be more effective <p>Messaging in different languages may be required, we would suggest that Mandarin, Arabic, Vietnamese, Hindi – as the top four language groups of more recent migrant waves may be more appropriate.</p>

Indirect drivers

Underpinning each of these direct and secondary drivers are **Hazard experience**, **Externalising responsibility**, and **Apathy**.

Hazard experience	<p>Describes the extent to which Melburnians have ever experienced any of the following flood-related events at their current residence:</p> <ul style="list-style-type: none"> • Water levels 2-3 centimetres above the ground floor level • Water levels halfway up the ground floor of your home • Water levels up to the ground floor ceiling or higher
Externalising responsibility	<p>The factor describes key attitudes about who should be responsible for managing floods (see Figure 25: Externalising responsibility). This has a negative impact on perceived risk.</p>
Apathy	<p>Present among those in the community who feel that there is nothing that can be done to prevent or prepare for floods (see Figure 26: Apathy factor). This has a negative impact on perceived risk.</p>



Putting it all together – recommended behaviour change techniques:

Communications / Marketing

Communications and marketing are vital to increasing awareness and preparedness of the local flood risk. We are recommending that communications centre around the two requirements of:

Increasing threat perception: susceptibility and severity

Improving self-efficacy by building knowledge of and access to information about:

- a. What actions to take before
- b. What actions to take during
- c. What to do after

Although this study focussed on people in flood-prone areas, for many that is not the lens through which they currently view their level of risk and attention to flood preparedness. An important step of behaviour change is for people in flood-prone areas to self-identify as such. Recognition of their status would be an effective mechanism for triggering preparedness behaviour. This is likely to be particularly powerful if residents learn about their personal risk level by seeking out the information themselves and share this self-identification of risk level with other people in their community.

Not all residents, even those in a flood-prone area, have the same level of flood risk and there are others outside flood-prone areas who are also likely to have questions about their risk levels. As different levels of risk require different levels of preparedness and engagement, it is recommended that communications could be tailored to different audience profiles and focus at a local level to unite people with the same risk rating and needs.

Information should be presented in manageable and actionable ‘chunks’, delivered at the appropriate time, to ensure relevance at each stage. If information or advice doesn’t apply in a particular situation it is likely to be disregarded. Providing information in clear steps when needed reduces cognitive load and increases the potential for people to take effective action, particularly when people are under stress. New facts (such as the 15cm to float and blocking drains) are particularly interesting and salient.

Organising information into risk categories and preparedness stages enables the different target groups to consume and understand the relevant information in a progressive way. Providing sufficient information at each stage (with ways to access more detail) means people are not overwhelmed, which can lead to paralysis and inaction.

To illustrate how each audience could be targeted with different communication requirements we have nominally created 3 groups:

1. High Risk
2. Medium Risk
3. Low / No Risk

Micro-targeting (direct and personalised communications) is recommended as an effective strategy to challenging the low risk assumptions of residents who are at high risk by increasing the perception that communications are personalised and addressing them specifically. Communications strategies that can customise to individual locations and trigger self-identification as belonging to the group of people who need to pay attention to this issue will be most effective

3-Step Messaging Approach: Check, Prepare, Act.

Check: The research has shown that most people assume the risk of flooding to be low and its potential impact not to be extreme. Any communication therefore becomes easy to dismiss when viewed through the lens of ‘this doesn’t apply to me’. It is also clear that actions that are perceived to require significant time, energy, attention or cost have a higher barrier to engagement. In line with findings that higher levels of preparedness are correlated with higher awareness, it is recommended that the first step to flood preparedness be a simple ‘low-cost’ action where a resident can determine their level of flood risk. Understanding their individual flood-risk identity has the potential to increase both awareness and agency, as well as build an ‘in-group’ mentality with other people in a similar situation in their community.

Ability to accurately determine their level of flood risk makes the threat more specific and would be expected to trigger and increase flood preparedness behaviour. It is recommended that a simple online tool be developed with residents entering their address, can quickly and accurately be advised of their level of flood risk. Ideally this tool should function as an information and connection portal to the actions they should then take.

Connection with this tool should be delivered at a local level and be as personalised and specific as possible. Leveraging identification of a risk level for a particular community and sharing knowledge promotes behaviour that is socially expected and acceptable and benefits not just individuals but the whole community. For example public notices, outdoor advertising and letterbox drops in flood prone areas that highlight individual household actions building and supporting local area actions and awareness.

If this tool was not immediately available, information about how to check individual risk level could be provided through links to the relevant information channels.

Prepare: Key messaging about recommended behaviour based on risk profile. This should be both generalised information and actionable content. Tailored content allows residents to be clear about what risks they face and what behaviour is required of them, and provides them the pathways to inform themselves and access help.

Act: Specific instructions for each stage of a specific flood emergency. The research shows that many people assume they have plenty of time to prepare and act. Guidelines and triggers should be clearly identified here and able to be accessed as required before and during an emergency event.

Channels and messaging strategies based on a suggested risk profile

	Low / No Risk Location	Medium Risk Location	High Risk Location
Step 1: Check	<i>Message that every resident has a responsibility to check if their home is in a flood-prone area. Communicate this simple action as an easy and quick first step to flood preparedness. Proactivity is rewarded as residents will quickly find out if they have to pay attention to this (or not) and it will be clear what actions they need to take.</i>		
Channel	<ul style="list-style-type: none"> General media Through relevant authorities 	PLUS LOCALLY TARGETED PUSH: <ul style="list-style-type: none"> Local media e.g. newspapers, outdoor Social media networks e.g. Good Karma network 	PLUS MICRO-TARGETED PUSH: <ul style="list-style-type: none"> Direct to resident: letterbox drop; personal visit Hyperlocal social media network
	<i>‘What is your home’s flood risk rating? Check here’</i>		



Message	<i>[link to website to input address. Identifies risk level and advises next actions]</i> <i>(If a tool to immediately identify an individual property's flood risk is not possible or available, support this initial question with links to resources and information to encourage engagement and build awareness of different resource sources.)</i>		
Target Information Needs	<i>Reminder of flood basics and community responsibility to avoid and / or be safe in flooded areas</i>	<i>PLUS: Cost of not being prepared, to you and your community</i>	<i>PLUS: Personal responsibility and requirement for active engagement</i>
Overarching message	<i>It is every person's responsibility to know their level of flood risk and make the right plans to protect the people and things that are important to them. Find out if you need to take action, what to do and where to get help within your community.</i>		
Message Style and Tone	<i>Straightforward, responsible, helpful.</i> <i>Foster a sense that there are protective and effective actions for everyone to take.</i>		
Specific barriers to address	<ul style="list-style-type: none"> • “Nothing I can really do” • “Won't be able to know what actions are needed until it happens” • “Not that much I can prepare in advance” • “Extra insurance will be expensive or not available to me, especially if I live in a high flood risk area” • “There will be expert help / instruction / information at the time so I don't need to prepare now” e.g. sand-bagging, army • “Most of the work will be in the clean-up” 		
Step 2: 'Prepare'	<i>Information and instructions in this section would be tailored to each target group based on their level of risk. A clear path of action with links to resources, checklists, registration with relevant authorities and emergency information sources could be compiled in a single location. Specific next steps and supporting resources are outlined. High risk residents in particular are likely to be focussed on these once they discover their risk rating. Even low risk / no risk residents can be provided with educational information about what might increase their risk and possible timeframes</i>		
Channel	<ul style="list-style-type: none"> • Adjacent to risk finder tool • Through all relevant authorities • Links from social media e.g. Good Karma and community networks • Sources: SES, local council, government 		
Message	<ul style="list-style-type: none"> • All to do essentials: clean gutters; register for emergency information services • Educate about universal protective flood behaviour e.g. 15cm to Float 	<i>PLUS (e.g. general flood protective actions)</i> <ul style="list-style-type: none"> • Actions you take now will be protective in case of a flood • Check insurance • Download VIC Emergency app 	<i>PLUS (e.g. specific flood protective actions)</i> <ul style="list-style-type: none"> • Create a flood plan and update annually • Register with your local council for access to flood materials in an emergency

	<ul style="list-style-type: none"> • Educate about risks • Educate about timing • How to help your community 	<ul style="list-style-type: none"> • Store documents in flood / fireproof box • House and garden design using flood aware principles • Make a flood action plan 	<ul style="list-style-type: none"> • Information about how to get assistance to prepare
Step 3: 'Act'	<i>Specific advice about what action to take in an emergency: how you will know, who will tell you, how you will find out, what you can expect. Available for information before an emergency, clear pathways to access and connect during an emergency.</i>		
Channel	<ul style="list-style-type: none"> • General media • Social media • BoM, SES, local council, Vic Emergency App 	<p>PLUS:</p> <ul style="list-style-type: none"> • Hyperlocal social media 	<p>PLUS:</p> <ul style="list-style-type: none"> • Physical presence
Message	<ul style="list-style-type: none"> • Even if your house isn't high risk, other areas can be. Reminder to avoid and actions to take if unavoidable • Protecting mental health 	<p>PLUS:</p> <ul style="list-style-type: none"> • If you need help, this is where to get it • This is how to help others in your community • How to manage after a flood 	<p>PLUS:</p> <ul style="list-style-type: none"> • What you should be alert for • Triggers to leave • What to expect from your community • How to summon emergency help

