

**NEW FLOOD PREPAREDNESS IDEAS
FOR
AN INEXPERIENCED
URBAN COMMUNITY**

for

1999 NSW FLOODPLAIN MANAGEMENT
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by

STEVEN MOLINO
PRINCIPAL
MOLINO STEWART ENVIRONMENTAL SERVICES

MIKE ROGERS
STORMWATER MANAGEMENT MANAGER
SUTHERLAND SHIRE COUNCIL

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ABSTRACT

The Woronora River Community is an urban community with little flood experience yet there is less than half a metre difference between minor and major flooding. Some new ideas are proposed to provide ongoing flood awareness and preparedness and to ensure that warning messages are easily understood and quickly responded to.

1 BACKGROUND

1.1 LOCATION

The Woronora River is in the Sutherland Shire 20 kilometres south of the Sydney CBD (see Fig 1). Its upper reaches are undeveloped and controlled by Sydney Water. Woronora Dam provides drinking water for the Sutherland Shire and some surrounding suburbs and has a catchment of about 80 square kilometres.

Downstream of the dam the river passes through sandstone gorge terrain. Much of these 95 square kilometres of catchment are covered in eucalypt forest but there is increasing urban development along the catchment's ridgelines.

There is also residential development along the banks and narrow floodplain of the final 11 kilometres of the Woronora River before it joins the Georges River near Como Bridge.

The reach of river along which development occurs is tidal.

1.2 DEVELOPMENT

Development in the Woronora Valley began with farmers, fishermen and oyster growers. Earlier this century, wealthy Sydney residents built "weekenders" there. Now most of the population is permanent residents who commute to work outside of the valley. Figure 2 shows the location of the riverside suburbs.

Most of the development is in Woronora, a suburb which nestles around a narrow floodplain and is linked by the Woronora Bridge. Many of the houses in this suburb are built on the floodplain. Others are built further up the Valley sides but most of these would have their road access cut by low level flooding.

Upstream of Woronora proper is Deepwater Estate. This is a strip of homes built right on the banks of the river for a distance of about two kilometres. These homes can only be reached by boat or pedestrian access from a water front road in Woronora. All of these homes could be affected by flooding

Opposite Deepwater Estate, and stretching upstream, is Shackles Estate. The homes are built further up the valley sides and have pedestrian and/or vehicular access from ridgeline roads. Only a few of these homes are low enough to be affected by the more extreme floods.

Downstream of Woronora is Bonnet Bay. This suburb was substantially developed in the 1970s and only a fraction of this suburb is within the PMF zone. Nevertheless, homes, yards and access roads for many areas could be flooded.

Further downstream, scattered houses are built along the riverbank at Como and Illawong. These homes have boat access as well as pedestrian access from ridgeline roads. The levels of these houses vary but some are built very close to the high water mark.

There are a few shops and a caravan park in Woronora but no other commercial or industrial developments in the Valley.

The settlements along the Woronora River are virtually fully developed and no increases in building density are proposed. There are regular applications to extend or replace existing dwellings.

1.3 FLOOD LEVELS

A flood study was undertaken in 1991 for the lower 11 kilometres of the Woronora River. The results were revised slightly as part of a 1995 floodplain management study.

The results are summarised in Table 1 for each of the main residential areas. The mean high water level is about 0.5m AHD

Table 1: Design Flood Levels (m AHD)

Suburb	5%	2%	1%	PMF
Como/ Illawong	1.5	1.6	1.9	4.2
Bonnet Bay	2.5	2.8	3.1	6.6
Woronora Bridge	3.0	3.3	3.6	7.4
Woronora	3.0-3.6	3.3-3.9	3.6-4.2	7.4-8.3
Deepwater Estate	3.5-3.7	3.8-4.0	4.1-4.3	8.1-8.4
Shackles Estate	3.5-3.9	3.9-4.3	4.2-4.6	8.4-8.8

Source: Acer Wargon Chapman (1995)

As can be seen from the table there can be up to 4.6 metres variation in flood level along the river for the same event and up to 4.9 metres variation at the same location for different events.

1.4 FLOOD DAMAGES

Table 2 summarises the number of properties and the number of houses affected by the various design flood levels.

Table 2 *Flooded Properties*

Design Flood	Number of houses with flooded yards	Number of houses with flooded yards and above floor flooding
5%	246	200
2%	283	254
1%	323	289
PMF	503	497

Source: Acer Wargon Chapman (1995)

As is apparent from the table, most houses with flooded yards would have above floor level flooding in the above events.

There were no design flood levels calculated for events smaller than the 5% event. Floor levels in the property database suggest that as many as a dozen homes could experience above floor flooding in an event which was only 1.5m AHD at Woronora Bridge and up to 60 homes would flood in an event which reached 1.8m AHD at the same location.

The two main access roads out of Woronora would be flooded at about 1.5m AHD.

The present worth of the average annual residential damages was estimated to be \$6.6 million (Acer Wargon Chapman, 1995). This included building and contents damages.

1.5 FLOOD HISTORY

Over the last 100 years the Woronora River has not experienced as many large floods as one would statistically expect.

There have been just over 20 recorded floods on the Woronora River since 1898. A flood in that year is thought to have reached the level of a 1 in 50 event but since then the highest flood has been a 1 in 20 event which occurred in 1926. The last flood of any note was in 1969 which was about half a metre lower than the 1926 flood. The 1933 and 1961 events were between the levels of the 1969 and 1926 event. Events in 1949 and 1956 reached the same levels

as the 1969 flood. The most recent flood was in 1988 but it only reached about 1.7m AHD at Woronora Bridge.

1.6 COMMUNITY PROFILE

The 1996 census data indicates that only 68 per cent of the Woronora population had been there for more than five years. If one assumes that a similar turn over rate has occurred for the last 30 years then only 10 per cent of the population which was at Woronora during the 1969 flood would still be living there. Considering that parts of Woronora have only been developed in the last 30 years, then very few of the existing residents would have experienced significant flooding on the Woronora River. This stretch of the river accounts for nearly 90 percent of houses affected by flooding up to the 1 in 100 event.

None of the flood-affected areas at Bonnet Bay were developed in 1969 so those residents have no significant flood experience. In fact, floods higher than the 1933 flood would be needed before homes in this area are flooded.

In the upstream areas of Shackles Estate and Deepwater Estate, which account for a little under 10 per cent of flood affected properties, the census data suggests a higher population turnover. Perhaps only 3 per cent of the 1969 population still live in the area.

The census data suggests that 92 per cent of homes at Bonnet Bay, Deepwater Estate and Shackles Estate are owner occupied. In Woronora there is about an 80 per cent owner occupancy although logic would suggest that the properties with an absolute water frontage would have a higher owner occupancy rate than this.

In the areas affected, more than 95 per cent of the population speak only English and a high proportion of the remaining five per cent speak it well or very well. This means that information presented in Plain English should be understood by virtually the entire community.

The consultation undertaken as part of the Floodplain Management Study made it clear that the Woronora Community is not only inexperienced in flooding but is also sceptical that the estimated floods could occur.

1.7 THE BRIEF

The 1995 floodplain management plan was completed with local community assistance. The plan proposed four strategies.

- Non-structural Options including flood forecasting and warning systems, community preparedness, and building and planning controls;
- Voluntary House Raising;
- Improved Evacuation Access; and
- A Levee Bank

Sutherland Shire Council improved the evacuation access but decided not to proceed with the levee after unanimous rejection of the proposal by the Floodplain Management Committee responding to community opposition. A policy for new development is being prepared and the flood forecasting system has been installed.

Molino Stewart Environmental Services, in association with Professional Public Relations, was commissioned to develop a *Community Preparedness Strategy* and a *Voluntary House Raising Program* to help complete plan implementation. This paper discusses the Community Preparedness Strategy.

The strategy was not only to make people aware of, and prepared for, flooding but it was also to investigate strategies for disseminating warning information.

2 THE ISSUES

This particular project had a number of unique challenges as well as those which are common to any flood preparedness strategy. The circumstances also presented some opportunities upon which we could capitalise. These are outlined in this section.

2.1 CHALLENGES

2.1.1 Communication Channels

Much of the cutting edge flood awareness work which has been implemented in New South Wales in recent years has been done in rural areas. Woronora, on the other hand, is part of a larger urban area and different factors come into play.

For example, rural residents are more likely to watch regional television, listen to local radio and read local newspapers than urban residents are. This doesn't mean that these media can't be used to communicate to urban communities but they have to be used in different ways. It would require greater effort to get flood awareness information for the Woronora River in the metropolitan media.

Urban communities are also more likely to receive “junk” mail and therefore information posted or delivered to residents impersonally is less likely to be read. Again, innovative ways must be found if information is to be delivered by these channels.

2.1.2 Community Experience

The Woronora River community is not unique in never having experienced a 1% flood. However, given that 200 houses would flood in a 5% event, it is a little unusual that very few of the residents would have any experience of flooding at all.

The infrequency of floods above a 10% event and the lack of a 5% event for more than 65 years not only makes it difficult for people to comprehend the impacts of flooding but sceptical that it can even occur at all.

It also makes it difficult to use a flood anniversary as a “teachable moment”. The only records we have for the flood on record is a notation on a bridge design drawing which indicates it occurred in 1898. There are some graphic descriptions of the 1926 and 1933 events in the local newspapers of the time but there are no photographs. In any case, these were only about 5% events.

2.1.3 Flood Levels

The flood levels for any given event can vary by up to 5 metres along the relevant few kilometres of river. The Woronora Bridge is the only major structure along the river to which levels could be meaningfully related.

Furthermore, only a small rise in flood levels is needed to flood hundreds of homes. The difference between no homes flooded and 100 homes flooded is less than half a metre.

Added to these local challenges are the universal challenges of residents:

- Not understanding the differences between tides heights, gauge readings and AHD flood levels;
- Not knowing the ground level in their yards or the floor levels in their houses; and
- Misunderstanding the concept of flood probabilities

2.1.4 Persistence and Perception

These are universal challenges in flood preparedness work.

- Ensuring the community remains prepared between events, especially when they are not very frequent;

- ensuring that the 100 or so residents that move into the flood affected area each year are brought up to speed; and
- dealing with community resistance to their properties being stigmatised as “flood prone”.

2.2 OPPORTUNITIES

Despite the abovementioned challenges, the Woronora River has a number of things in its favour in terms of communications.

The Woronora River’s topography means that a large proportion of the flood affected community is geographically isolated from surrounding suburbs and this engenders a heightened sense of community. This is reflected in the number of local community groups and associations such as Woronora River Residents’ Environmental Action Committee, Woronora Valley Association, Woronora Valley Precinct Committee, Woronora RSL Club and Woronora River Life Saving Club.

There are three local papers delivered to the Valley and, from all accounts, the locals take a greater interest in their contents than would be typical in many urban areas. There are also two local radio stations which broadcast community service information.

There are only a few access points for the affected residents. While this might constrain evacuations, it does mean that a small number of signs can be used to reach a high percentage of residents. The Woronora Bridge is particularly useful because it is next to the river and would be passed by the majority of residents almost daily.

The Standard Emergency Warning signal was launched and the PC Cops phone warning system was being trialled in the Sutherland Shire during the preparedness strategy development.

3 OUR PHILOSOPHY

3.1 THE THREE M APPROACH – MODES, MESSAGES, MEDIA

We took the view that an integrated strategy was needed which not only made people **aware** of, and **prepared** for flooding but also **warned** them of floods and provided them with the resources to **respond** during a flood and **recover** afterwards. We called each of these a **mode** in which information must be communicated.

We also believed that there needed to be simple **messages** used in each mode which would be reiterated, reinforced or elaborated upon in other modes. A consistency of the messages' content and form across each mode would be a key to making the messages easy to understand.

Finally, we needed to identify the **media** through which each message would be delivered in each mode. Some of the media would be used to deliver the same message in several modes and this would ensure simplicity and consistency of communication.

Our three M approach is summarised in Table 3 for the strategy which we proposed. Strategy details are elaborated upon in Section 4.

Table 3: The Three M Approach to Flood Preparedness

	MODE				
	AWARE	PREPARE	WARN	RESPOND	RECOVER
MESSAGE	<ul style="list-style-type: none"> Flood Prone Flood Categories The Plan 	<ul style="list-style-type: none"> What to Expect What to do Where more Information 	<ul style="list-style-type: none"> When What Category Where more details 	<ul style="list-style-type: none"> What to do before and during a flood 	<ul style="list-style-type: none"> What to do after a flood Where help
MEDIUM					
Flood Sign	X				
Flood Totems	X				
Household Package					
House sticker	X		X	X	
Fridge magnet	X	X		X	
Bin stamp	X	X			
Brochure	X	X		X	
Booklet		X		X	X
Ruler	X				
Colouring Sheet	X	X			
Telephone Book	X			X	
Events	X	X			
Awareness Week	X	X			
Competitions	X	X			
Newspapers	X				X
Radio			X	X	X
Emergency Warning Signal			X		
Telephone In		X		X	X
Telephone Out	X		X		
Door to Door	X		X	X	X
Public Address System			X		

3.2 MESSAGES

Some fundamental decisions had to be made regarding the messages that would be delivered.

3.2.1 How Public?

We believed that every property owner needed to know specifically how their property would be affected by flooding and what they should do to protect it. We understood that people would not want that information advertised to all and sundry but at the same time we needed to ensure that it was passed on to all new residents.

We took the approach that simple consistent messages should be spread by ubiquitous media that reminded residents that flooding is an issue they need to know about. Personalised media would then be given to each resident that detailed how they would be affected and that information would be kept in a known location or renewed from a single source.

3.2.2 How Detailed?

We also had to decide what flood information was to be conveyed. It was decided that there would be no benefit, and many disbenefits, in referring to flood frequencies in whatever guise. We decided to simply show physically, and describe in words, the levels of historical floods and the potential for larger floods.

Describing flood levels was also considered too complicated and open to misinterpretation. Firstly, people would need to understand that it was metres AHD and not gauge height or tide heights. Then they would need to know that it referred to a specific location and would have to be converted to a level at their location. Finally this level would need to be interpreted in relation to their property and floor levels. Not to mention the fact that giving a particular level suggests a precision of prediction that is potentially misleading.

We decided that a better approach would be to categorise bands of flooding and advise residents how a flood in each category might affect them. This leaves all the conversions of levels to the experts and provides a fuzziness for forecasts.

Our first thought was to use the widely accepted categories of minor, moderate and major and add a fourth category of extreme. However, the circumstances in the Woronora Valley are such that a river rise of less than 0.5 metres would cause a change from the onset of minor flooding to undisputed major flooding, based on currently accepted definitions. Yet there would be no particular level at which one could say it jumped from one category to another. Furthermore, the words themselves mean different things to different people, depending on their knowledge and experience of flooding.

We had already decided that colour coding the flood categories in the different media would assist in visually reinforcing the concept of different flood categories. In consultation with the SES, we decided that using the names of the colours for each of the flood categories would provide an unambiguous distinction between categories. This had the added advantage that remembering categories would be more directly visually reinforced by colour coded media.

The adopted flood categories are given in Table 4. The 0.8m interval was chosen for all categories because:

- it is larger than the confidence band of peak height predictions;
- it allows for four flood categories without indicating depths which would not be credible to most residents; and
- the changeover levels in most cases correspond to something which has some significance.

Table 4 Woronora Flood Categories

FLOOD CATEGORY DESCRIPTOR	RANGE AT WORONORA BRIDGE (m AHD)¹	COMMENTS
Green Category	1.5-2.3	Onset of flooding with roads cut and some houses flooded through to many homes flooded
Blue Category	2.3-3.1	Hundreds of homes flooded. Upper end of category floods low level bridge and corresponds to flood on record
Yellow Category	3.1-3.9	Hundreds more homes flooded. Upper end of category is current planning level ² .
Red Category	Above 3.9	Up to 500 homes flooded. Flooding of homes which would not have received notification of flood risk on 149 certificate.

1 – “m AHD” is effectively metres above mean sea level.

2 – “planning level” is the level above which the habitable rooms of any new development must be built. On the Woronora River this is 0.5m above the 1% flood level.

3.2.3 Who Delivers?

There is the potential for messages and media to come from either Sutherland Shire Council or the State Emergency Service (SES), and possibly other sources. It was decided that to ensure consistency, control and accountability, messages should come primarily from the SES.

In some cases Council will be the conduit through which the messages are delivered or will arrange for the preparation of the media. Overall the SES will deliver preparedness and warning information door to door or co-ordinate its delivery. It will be responsible for providing residents with more details or replacement media if required. To this end an SES contact telephone number will appear in all media.

The local radio station frequency will also be used throughout media to remind people to get detailed information through that medium in warning, respond and recovery modes.

Each message in each mode will need to be delivered by several media to maximise the potential for everyone to receive the message. This is particularly important in the warn and respond modes when time is of the essence.

4 PROPOSED STRATEGY

4.1 MODES AND MESSAGES

4.1.1 *Aware*

In this mode people must get a general awareness of their flood exposure and realise they have to do something. This not only has to get their initial attention but also must ensure an ongoing awareness of flood risk and management.

They need to understand that:

- they live in a flood prone area;
- there are different categories of flooding;
- there is a plan to help them;
- the plan includes action by them.

Messages in this mode are not intended to provide detail but rather refer residents to where they can get more information and encourage them to do so. Another way of looking at this mode is that it gets people ready to take the flood preparedness and flood warning messages seriously when they are delivered.

We proposed the following messages:

- Slogan - The Woronora Floods - Are You Ready?
- Physically indicate the ranges of flood categories on signs and totems. Colour code flood categories for easy cross-referencing between media in various modes.
- Link the future flood risks to historical fact by relating the levels of large historical floods to existing physical features.
- There is a plan to prepare and warn residents
- Residents must act to benefit from the plan
- Display phone number and radio band for flood information. XXXX XXXX, 2SSRFM 99.7.

4.1.2 *Prepare*

In this mode the messages need to be targeted at flood prone households and businesses in the Woronora Valley. They must provide a lot more detail and the media will include those which are to be retained by the householder for

future reference during and after a flood. That is, some of the preparedness media will be used in the event of a flood during respond and recover modes.

We recommended repeating the awareness messages plus adding the following detail:

- What to expect - devices which translate the flood categories to velocities and depths at particular locations. Keep this information simple e.g. “Up to one metre deep and strong current” or “a flood will enter your house”.
- What to do before, during and after a flood
- Where to get more detailed information

4.1.3 Warn

The emphasis in this mode is to disseminate the warning as quickly as possible. This requires brief messages but they must be sufficiently informative for people to know how to act.

The key to delivering brief messages which can be quickly translated into action relies on well set up prepare and respond mode messages. The warn mode messages really need to refer people to these. This reference can either be simply reminding them of what they have already heard and learnt or pointing them to a resource which has more detailed information. It is important then that the language used in the messages in all three modes is consistent, as should be any visual cues.

With this in mind we recommended the following key messages be delivered in warn mode.

- Category of flooding expected - colour
- Time flood expected to peak
- Where to get more details – radio frequency, telephone number, house sticker

4.1.4 Respond

This is the mode in which people must act on the warning messages. Some people may have learnt the preparedness messages well enough that they know what to do immediately they hear a warning. For most however, they will need a readily accessible source of information to which they can refer so they know what to do.

Essentially these messages must be the same as the preparedness messages for what to do before and during a flood. Many of the media used to deliver the preparedness messages will be designed to be kept for use during the respond

phase. These will be supplemented with other media which provide other avenues to receive these messages.

4.1.5 Recover

After the flood peak has passed it is important that people know what to do to protect their personal safety and to salvage as much value as possible from their property.

Essentially the same as the preparedness messages for what to do after a flood with some elaboration of detail.

4.2 MEDIA

The following includes a full list of our suggestions. Not all were adopted by the Working Party for recommendation to Council.

4.2.1 Flood Signage

Bridge Sign

A sign near the Woronora Bridge which would physically show the levels of the different flood categories. It would also show the levels of significant historical floods. The slogan and local radio station frequency would be displayed prominently. Figure 3 is a draft design.

Totems

Because the flood sign would be remote from most people's houses they may have difficulty in relating the flood categories to the levels of their yards or floors. Flood totems would be used throughout the flood-affected areas to help people understand where a particular category of flood may come to on their property. These would simply have coloured stripes showing the levels of the different flood categories at the totem location.

Those who have seen the sign or read their householder package should understand the significance of the colours. Residents who don't know would become curious and would probably be told by neighbours to look at their householder package (which hopefully should lead to requests by households which don't have one).

The lack of writing on the poles would make the job quicker and cheaper. It may also minimise perceptions of adverse impacts on property values.

House Labels

Using information on the Council's flood damage database, it would be possible to identify how various levels of flooding would affect each property. A property-specific label which advises the flood categories which would enter that home would be a useful adjunct to a warning message, particularly in helping them understand how they might be affected by a flood. It would have some benefit delivering an awareness message too.

We recommended it be placed in the electricity meter box because:

- Every house has one
- New residents could be told where to find it
- It would make it easier to ascertain which houses do or don't have their labels in place in the future
- It is not exposed to the elements

Although labels would be provided for each house it would not be possible to place them on the house without the owner's permission. The householders could be given the labels and asked to place it themselves with the risk they never get around to it. The recommendation was that the distributors of the householder package advise the resident of the label and offer to place it there and then. If they don't want it placed, then give it to them to place themselves.

The meter box sticker will be referred to by many of the other media in the, aware, prepare and warn modes. Figure 4 is a draft design.

4.3 HOUSEHOLDER PACKAGE

We recommended a package be distributed to each household to raise flood awareness and provide resources for preparedness, response and recovery. We suggested that it be delivered door to door by SES Officers and volunteers. This would:

- Ensure each householder received one and knew what it was about;
- Reinforce the importance of its contents;
- Provide feedback on residents' attitudes to flood preparedness;
- Raise the profile of SES and its role in flood response;
- Give SES personnel a better understanding of the area so that door to door delivery of warning messages would be more efficient;
- Provide the opportunity for residents to have questions answered.

Distributors could spend a lot of time answering questions before householders have read the package. It would probably be more cost and time effective to organise some public meetings after the distribution. This would allow residents to read the material, then come along with any questions which they have. Various experts could be on hand to answer questions which might be too technical or detailed for distributors to answer. It would also allow people to hear questions which they themselves may not have thought of and would also ensure that answers to questions are consistent.

The SES would be responsible for ensuring that new residents received a kit or that existing residents get replacement kits or components if lost.

We recommended that the kit consist of:

- An eight page B5 **brochure** specific to the Woronora River. The brochure provides a succinct and simple explanation as to why household packages are being distributed, what the flood categories are, what to do before during and after a flood and what the flood categories mean for each part of the valley.
- The generic flood preparedness **booklet** “What to do Before, During and After a Flood”, prepared by Emergency Management Australia. This contains all of the essential detailed information that a householder would need.
- A fridge magnet, specific to the Woronora, would provide a readily accessible summary of the key preparedness messages.
- Something specifically for children. This would encourage the family to at least open the package and it would also deliver part of the awareness and preparedness messages to the children. It could include a colouring competition with flood awareness questions that would require adult help to answer.

4.4 WHEELIE BINS

We suggested that one idea worth considering would be to hot stamp a flood awareness message on “wheelie bins” belonging to potentially flooded homes. This would have the following advantages:

- it is novel and therefore likely to capture people’s attention;
- unlike the household package it is not easy to lose or throw in the garbage; and
- the bin stays with the home, not the homeowner. This means that there is a flood awareness message passed on to each person that moves into the area.

For technical reasons the message needs to be kept short. We suggested “the Woronora Floods: Are You Ready. Phone XXXX XXXX”

4.5 EVENTS

The prevailing philosophy of flood awareness and preparedness is that people are more receptive to flood awareness and preparedness messages during a “teachable moment” (Keys, 1995). This might be during heavy rain or on the anniversary of a major flood.

For the Woronora there are no logical “teachable moments” that can be planned. Rather than waiting for a “teachable moment” to arrive to launch an education campaign it might be better to create “events” then capitalise on “teachable moments” when they do arise to reinforce messages.

Created events might be the:

- Sign unveiling;
- Totem placement;
- Householder package delivery;
- Stamped bin delivery; or
- A Flood Awareness Week.

Other opportunities will arise from time to time such as floods on nearby rivers. At these times a series of media releases and articles could be sent out which reminds people of the flood risks on the Woronora.

4.6 PRINT AND ELECTRONIC MEDIA

Local Papers

Local papers could be used to run items on events and competitions as well as general information about flood awareness from time to time.

Local papers would also be very important in the recovery mode. They could provide special supplements with advice on how to clean up after a flood.

Radio and Television

These would have a role in warning dissemination. They would broadcast the Standard Emergency Warning Signal, if appropriate, and information on the expected flood category, its timing and the number to ring for more details.

The local radio station 2SSR FM will be particularly important in this regard and its frequency will be displayed on the flood sign and in other distributed media. This station could be used to provide more detailed respond-mode messages for those who are not sure what to do.

In the recovery mode it would be good to enlist the help of the local radio station. They could either provide tips at regular intervals on how to clean up and salvage or they might even be interested in hosting a talk-back session on the subject.

4.6.1 Telephone

PC Cops

PC Cops is a computer controlled telephone system with dial-in and dial-out capabilities. It works differently in the two different modes.

In the dial-out mode PC cops would ring out to all houses in the flood zone. Those who answer the phone will be told that there is a warning message and they will be instructed to press a key on the phone to receive the message. If they choose to do so they will hear a recorded flood alert providing flood category and timing of peak. This message could also advise them to tune to the local radio station for updates and more detailed information. It can be programmed to only ring a selection of numbers, for example only those who will be affected by the predicted “blue category” flood.

In the dial-in mode it provides the ability to dial in for an information message. It uses a hierarchy of menus and, on first ringing through, one might have to select an option such as police, fire services or SES. When in the SES selection, there could be three options provided by selecting different numbers. The first could be the updated flood-warning message; in non-flood times it would simply say there is no flood alert. The second could be how to prepare for a flood and would repeat the information in the brochure.

4.6.2 Public Address System

Police or Emergency Service vehicles and vessels patrol the streets or the river, broadcasting a warning message.

4.6.3 Door Knocking

This would be used for delivering the householder kits as explained above. It should also be utilised as a means of distributing the warning message. This could be done either by SES personnel, community wardens or a combination of both.

This method has the following advantages over some of the other media proposed to issue warning messages:

- The message is personal and is delivered by an individual who has some authority.

- There is the opportunity to reiterate or reword the message until it is understood by the recipient;
- There is the opportunity to answer specific questions that residents may have;
- It identifies which houses are vacant or in the process of being evacuated;
- It provides feedback on whether people are likely to act on the warning; and
- It identifies those who will need assistance in moving possessions or evacuating.

Despite all of these good points it does have its drawbacks not least of which are the human resources it requires.

5 CONCLUSIONS

The Woronora project has provided the opportunity to develop some new ideas in flood preparedness. In particular, it has resulted in:

- The Three M approach to designing a flood preparedness strategy;
- The description of flood categories by colour codes rather than traditional adjectives;
- The dissemination of property specific flood effect data to individual properties through house stickers etc;
- The issuing of flood warnings by colour rather than level; and
- The use of ubiquitous media such as stamped wheelie bins and striped flood totems to prompt rather than explain flood message.

At the time of writing, the recommended strategy was still passing through the various levels of Sutherland Shire Council for approval. The SES had also commissioned a baseline attitudinal survey on flood issues in the Valley. Time will tell how many of the recommendations are eventually implemented and how effective they will be. The real effectiveness of these ideas can only be gauged after a flood.

REFERENCES

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