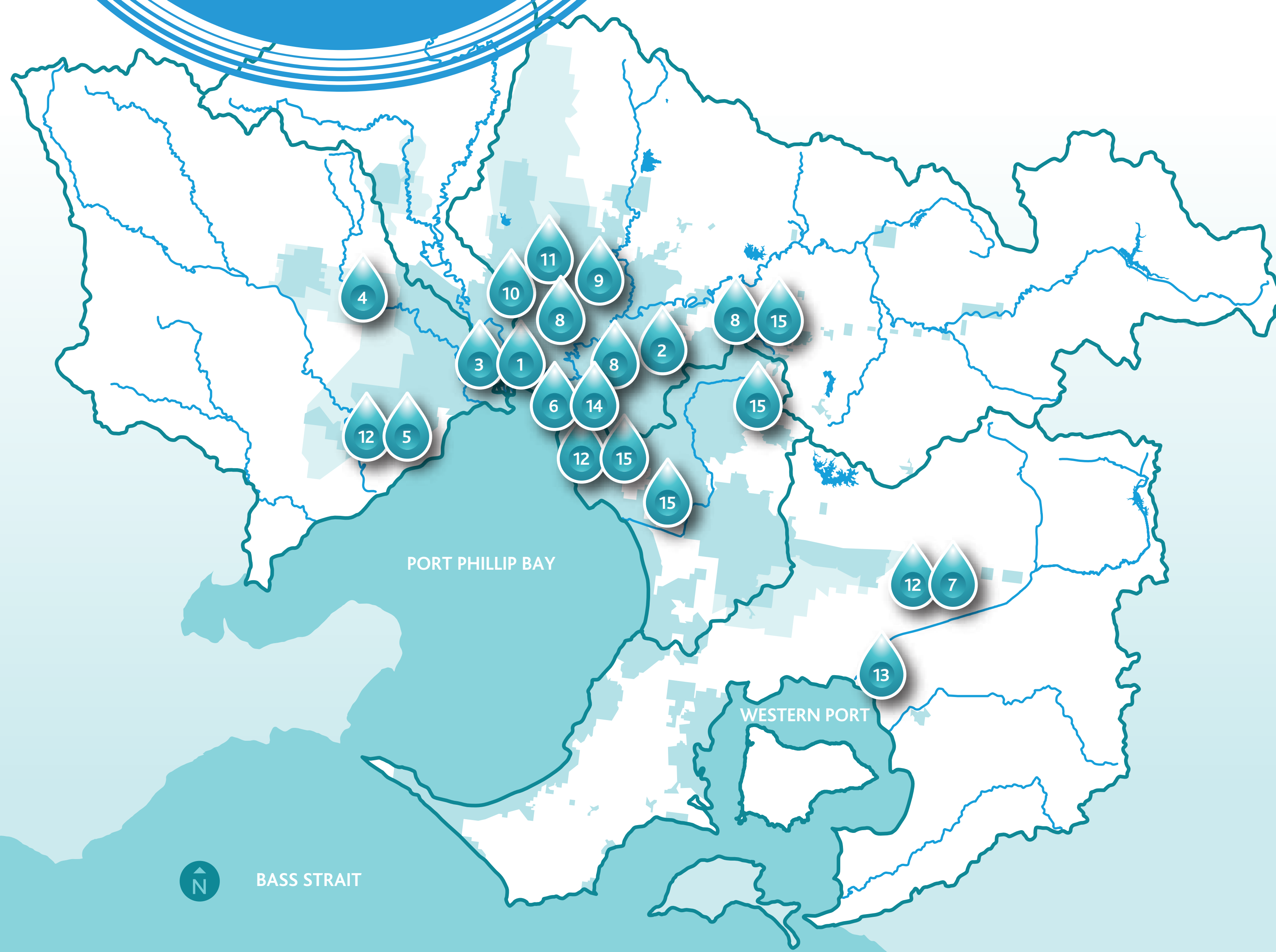


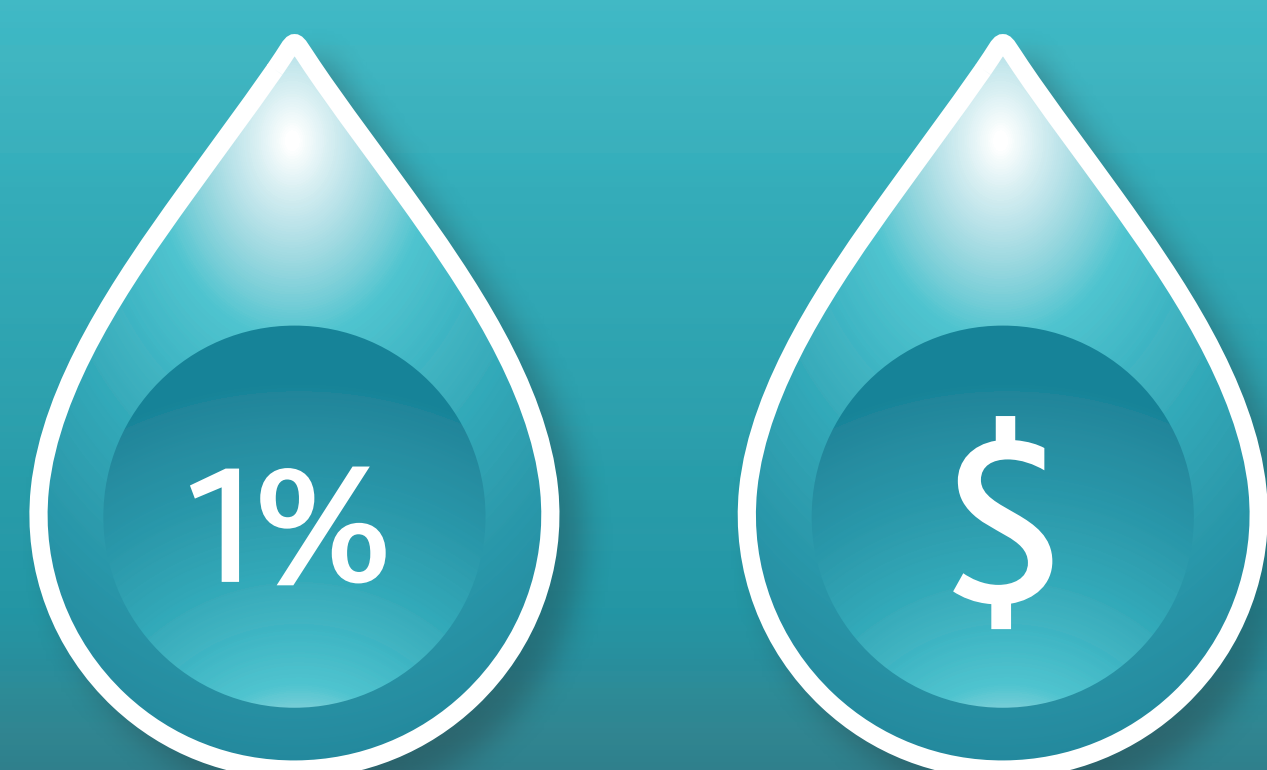
Floods: a recurring natural hazard



History of Port Phillip and Westernport flooding – some key events

1. 1891 - Melbourne: The Great Flood
2. 1934 - Across the Yarra catchment: over 200mm of rain in 48 hours
3. 1972 - Elizabeth Street, Melbourne CBD: 78.5mm of rain in 1 hour
4. 1974 - Maribyrnong River: 110mm of rain in 48 hours
5. 1983 - Werribee: 60mm of rain in 24 hours
6. 1994 - St Kilda Marina: highest tide reading of 1.29m
7. 1996 - Bunyip: 42mm of rain in 24 hours
8. 2003 - Darebin, Banyule, Whitehorse & Manningham: 106.5 mm of rain in 2.5 hours
9. 2004 - Eastern and north-eastern suburbs: severe localised storms
10. 2005 - Melbourne region: up to 125 mm of rain in 24 hours; widespread riverine flooding
11. 2006 - Northcote and Coburg: 75.2 mm of rain in 30 minutes
12. 2011 - Melbourne CBD, Elwood, Werribee and Bunyip regions: up to 150mm of rain in 14 hours
13. 2012 - Koo Wee Rup: 80 mm of rain over 2 days
14. 2014 - St Kilda Marina: second-highest tide reading of 1.28m
15. 2016 - Darebin, Banyule, Maroondah, Glen Eira, Port Phillip: 58mm in 28 minutes

Floods happen regularly across Melbourne



Approximately 232,000 properties are estimated to be at risk of flooding (with at least a 1% chance of flooding per year).

Floods cost all of us around \$400 million a year. As well as the financial cost, there is also an emotional toll.



Managing floods

The Victorian Government flood strategy leads a shared approach by government agencies to emergency management, risk assessment, prevention, preparedness, response and recovery.



Victoria State Emergency Service

- Emergency response
- Community education and awareness



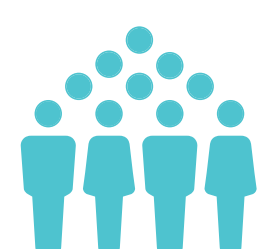
Councils

- Assist after a flood has occurred
- Responsible for the local stormwater drain system
- Planning schemes: controls on development



Melbourne Water

- Responsible for big regional drains, rivers and creeks
- May be called in to help with floods that result from the regional drains



Community

- Understand local flood risks, be prepared and take action to reduce impacts
- Have a good drain system on your property and keep it well maintained

Reducing the impacts of flooding across Melbourne



Infrastructure

Since 2014, Melbourne Water has invested more than \$18 million on maintaining and \$124 million on improving the regional flood and drainage system for Melbourne.



Planning and development

Improved urban planning and standards so that new developments and their neighbours are safer from floods.



Improving our understanding

Flood mapping to better understand where and how often floods occur. This supports better education, warnings, emergency management and infrastructure improvements. Melbourne Water is trialling SMS early warning systems for flood-prone communities.



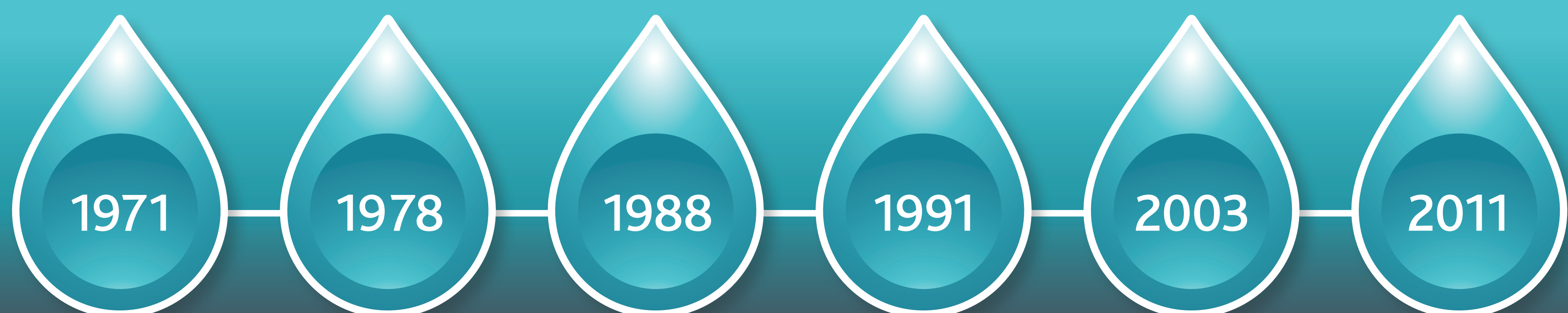
Education and awareness

Community information is being rolled out in flood prone areas. For example, the SES:

- attends thousands of festivals and events across the state
- visits over 500 schools each year
- issues 'be prepared' warnings via media
- has trained 5,500 volunteers to deliver the education program
- conducted 14,000 doorknocks and sent 50,000 mailouts to impacted residents.

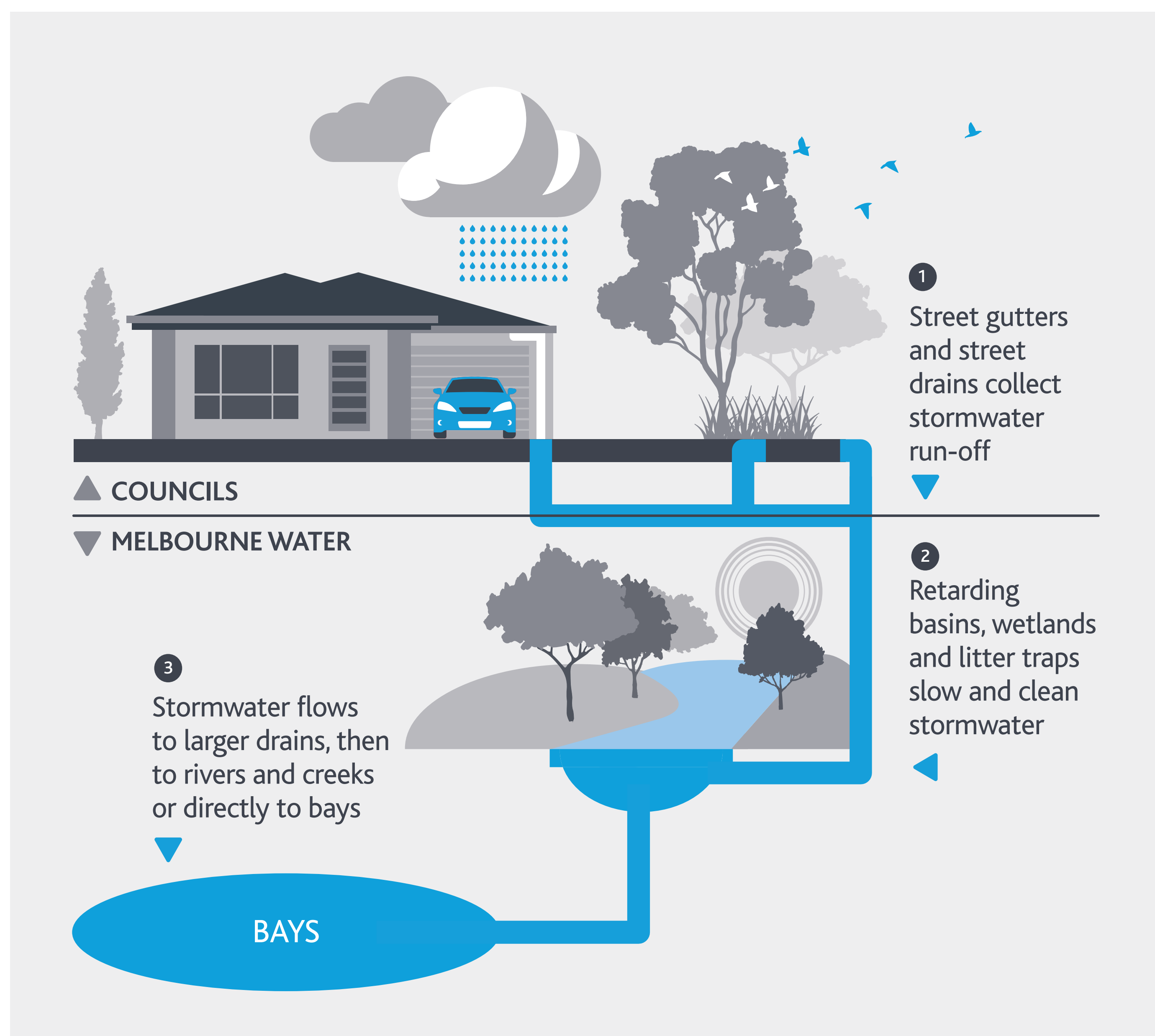
Floods in the Banyule municipal area

FLOODS HAVE OCCURRED IN BANYULE AT LEAST FIVE TIMES IN THE LAST 35 YEARS



Banyule is a flood-prone area due to the hilly terrain. When there is a big storm, it can flood quickly and with little warning.

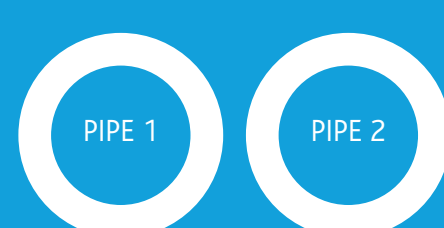
Managing stormwater in the area



MELBOURNE WATER AND COUNCILS SHARE RESPONSIBILITY FOR MOST OF MELBOURNE'S DRAINAGE SYSTEM

- Rosanna and Heidelberg have a higher level of flood protection than most areas of Melbourne.
- Local drains are managed by the council and built to cope with storms that have a 20% chance of happening in any given year.
- Main drains or waterways like Salt Creek are managed by Melbourne Water.
- When built, the drains along Salt Creek were designed to cope with a storm with a 1% chance of occurring in any given year.

- Melbourne Water improved the drains along Salt Creek in 1992. A second pipe was added and a retarding basin was constructed in the Harry Pottage Reserve. Together, these works more than doubled the drain capacity.



The second pipe added in Salt Creek in 1992 doubled the capacity of the drain

Reducing the impacts of flooding across Banyule



Infrastructure

\$4 million spent on infrastructure upgrades in Banyule in 1992.
\$180,000 spent since 2014 maintaining the regional flood and drainage system in Banyule
\$550,000 spent by Council every year upgrading the local drain network.



Planning and development

New planning controls and flood advice developed to protect 1509 properties in 2004.
Further planning scheme amendments to help protect properties in 2016.
In 2015-6, 56 development applications reviewed to remove properties from flood waters and to reduce the impact of development.
In 2015-6, 163 flood information requests reviewed to provide flood information to property owners and people interested in purchasing or redeveloping property.



Improving our understanding

Local flood mapping to better understand where and how often floods occur. This supports better education, warnings, emergency management and infrastructure improvements.



Education and awareness

Community information is being rolled out in flood prone areas including SES doorknocks.



December 2016 floods: what happened and why?



AN EXTREME AND UNUSUAL STORM

When the drains overflowed, the water created widespread flash flooding in Bundoora, Heidelberg, Macleod, Rosanna and Viewbank.

76mm of rain fell during the storm, 58mm of this fell in 28 minutes.

This is over a month's rainfall in less than 30 minutes - too much for the drains to cope with.

The drains worked to their full capacity during the storm. They simply couldn't cope with such a huge amount of water falling in a short time.

This storm caused floods in many parts of Melbourne with some of the heaviest rainfalls on record in Victoria.

HOW WE RESPONDED

SES, Banyule City Council and Melbourne Water worked together to respond to the storm by clearing rubbish and trees, and checking and clearing drains. We visited flood affected residents to better understand how they had been affected and share information. We did a thorough investigation to understand how the drainage system performed.

SES responded to 174 calls for assistance from people affected by the storm.



Checking and clearing drains



Helping affected residents clean up



Before



After



What we will be doing

THE SES, BANYULE CITY COUNCIL AND MELBOURNE WATER WILL CONTINUE TO WORK TOGETHER TO REDUCE THE IMPACTS OF FLOODS IN BANYULE.



Infrastructure

Melbourne Water inspects and cleans all key drainage assets as part of a monthly maintenance program. The grill on the Salt Creek pipe inlet is a high priority asset and is inspected and cleaned fortnightly. This work includes removing litter and debris, desilting, rehabilitation works, weed control, inspections and checks.



Planning and development

Modelling has been done in Banyule which will be used to inform planning overlays. Overlays help control development to create properties that are built above the flood zones.



Improving our understanding

Flood mapping to better understand where and how often floods occur. This supports better education, warnings, emergency management and infrastructure improvements.



Education and awareness

Since 2010, the SES has been helping the Banyule community prepare for flooding by providing community education about:

- being prepared for flooding
- what to do when floods happen
- how to minimise risks to properties and possessions.

This will continue in flood-prone areas.

