

# Where does all the stormwater go after the Sydney weather clears?



*Epic journey: Drivers negotiate Oxford Street, Paddington during the Sydney storms. Photo: Louise Kennerley*

Every year around 500 billion litres of stormwater – enough to fill Sydney Harbour – runs from Sydney to the sea. This is an account of its epic journey through the streets.

## First stop

City rain runs off roofs, footpaths, roads and carparks and into pipes and channels, at which point it becomes urban stormwater.



*Overwhelming the system: Flooding in Riverview Crescent, Dulwich Hill in April 2105. Photo: Peter Rae*

Sydney Water's 447-kilometre network represents less than 5 per cent of the total metropolitan stormwater infrastructure. The rest fall under local councils

"We tend to lose touch that before we built a city here we had hills, rivers and creeks," said Kaia Hodge, manager of Sydney Water's Liveable City programs.

"They are now either brick built or concrete channels, which was done during the Great Depression."

The Cooks River, upper parts of the Parramatta River and creeks around Rockdale are all channels which were straightened and lined with bricks and concrete to stop erosion, an approach no longer favoured.

"If you move out to western Sydney, you'll notice a lot of the newer areas try to keep the natural waterway form. They have much less concrete," Ms Hodge said. Vegetation is used to stabilise channels where possible.

## Picking up passengers

From solid land surfaces stormwater quickly picks up microorganisms and nutrients, like nitrogen and phosphorus, some of which comes from fertiliser, dog droppings and sewer overflows. It is the major source of pollution in Sydney's waterways.

Along roads and commercial and industrial areas stormwater picks up heavy metals, like zinc, copper and lead in low levels and a certain amount of petroleum and diesel. It also picks up metals associated with the breakdown of the elements of a car, like brake linings and car tyres.

Ms Hodge has seen everything, from cars, to dead Christmas trees and even dead animals.

"I remember somewhere along Duck Creek from time to time, we would find these large unopened tins of olives."

## Pressure's on

During the recent big storms, Manly's waterways were under the pump as they attempted to deal with the immense levels of water hitting Manly Dam, with high tide peaking at 1.9 metres.

The bigger flows that overwhelm the stormwater system, so great they can no longer stay in the pipe, are a major danger during storm events, said Todd Dickinson of Warringah Council.

"Unfortunately in a lot of locations in Sydney, some of the development decisions of 100 years ago have meant infrastructure and private property are located in those overland flow paths, like we saw last week.

"The risk for us is not three days of constant rain. The risk is two hours of very intense rain because there is no warning," he said.

## Filtering

In some areas the water in large stormwater drains will be screened and filtered through Stormwater Quality Improvement Devices (SQIDS), but these only pull out litter and larger matter.

Wetlands are also used as natural filters, stripping pollutants out of stormwater, like the Cup and Saucer Creek along the Cooks River.

"It's partly filtration, partly natural ecosystem processes," said Ms Hodge.

Increasingly, councils are installing rain gardens and tree pits in road verges and footpaths to capture litter and remove nutrients and pollutants before stormwater makes its way into pipes and waterways.

## Where to next?

All of the stormwater systems in the Sydney metropolitan area discharge to one of three receiving waters: to the Parramatta river via Sydney Harbour and out to sea, into Botany Bay and out to sea via the Cooks River, Georges River or Woronora River, or from western Sydney back into the Hawkesbury Nepean River system.

The Illawarra Region drains into other systems.

## Using stormwater

Stormwater harvesting involves the storing and treating of stormwater in urban areas, for use in irrigation and watering systems on playing fields, sports grounds and golf courses.

The priority in harvesting is to use stormwater in a way "that's not going to cause problems for human health," said Ms Hodge.

She said any attempt to treat stormwater for human consumption would be "simply not warranted" because of the chemicals and energy output it would involve.

"Stormwater is a volume related thing, the more of it there is, the more problems it causes, so anything you can do to get rid of some of the volume actually helps the problems downstream," said Stormwater Australia president Andrew Allan.

# STORMWATER

WHERE  
DOES IT  
ALL GO?



**500  
BILLION  
LITRES**

the amount of storm water  
that flows into the ocean  
from Sydney every year

That's about as much water  
as is in Sydney Harbour

**IT'S RAINING,  
IT'S POURING...**



**Rain falls and becomes storm water  
as it runs off roofs, roads and  
surfaces in urban areas.**

# NUTRIENTS AND POLLUTANTS

**ALONG  
THE WAY,  
STORM  
WATER  
PICKS UP...**

## NUTRIENTS

like nitrogen and phosphorus, from fertiliser, dog droppings and sewer overflows



## METALS

like zinc, copper and lead



## OILS

from bitumen, car brake linings and car tyre residue



## INTO THE PIPES

The storm water system usually starts at the kerb and guttering on the roadway, before it discharges into pipes.

Pipes in the street can be as little as 4-6 inches in diameter, but heading into main waterways channels can be as big as rivers.



# CULVERTS

The biggest channels are called culverts, which can be several metres wide and deep.

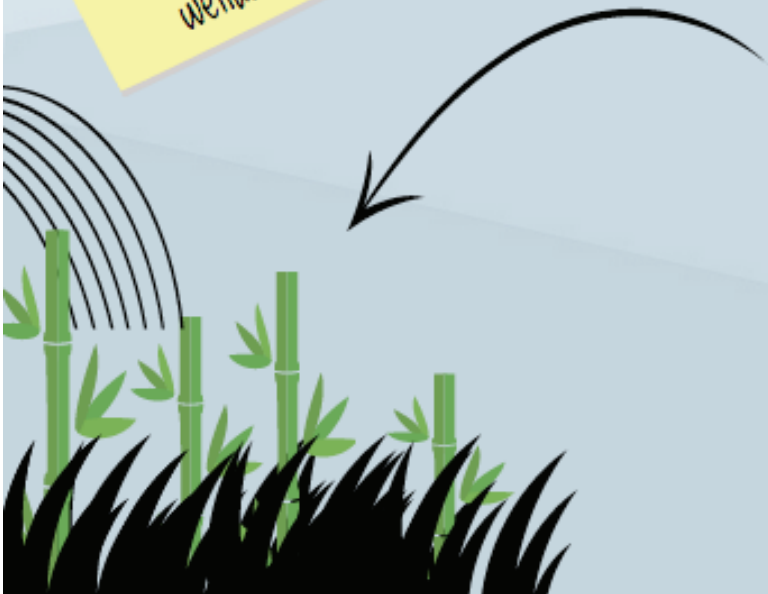
In culverts storm water can pick up rubbish, dead animals, old christmas trees and even cars, which are captured in large storm water drains.



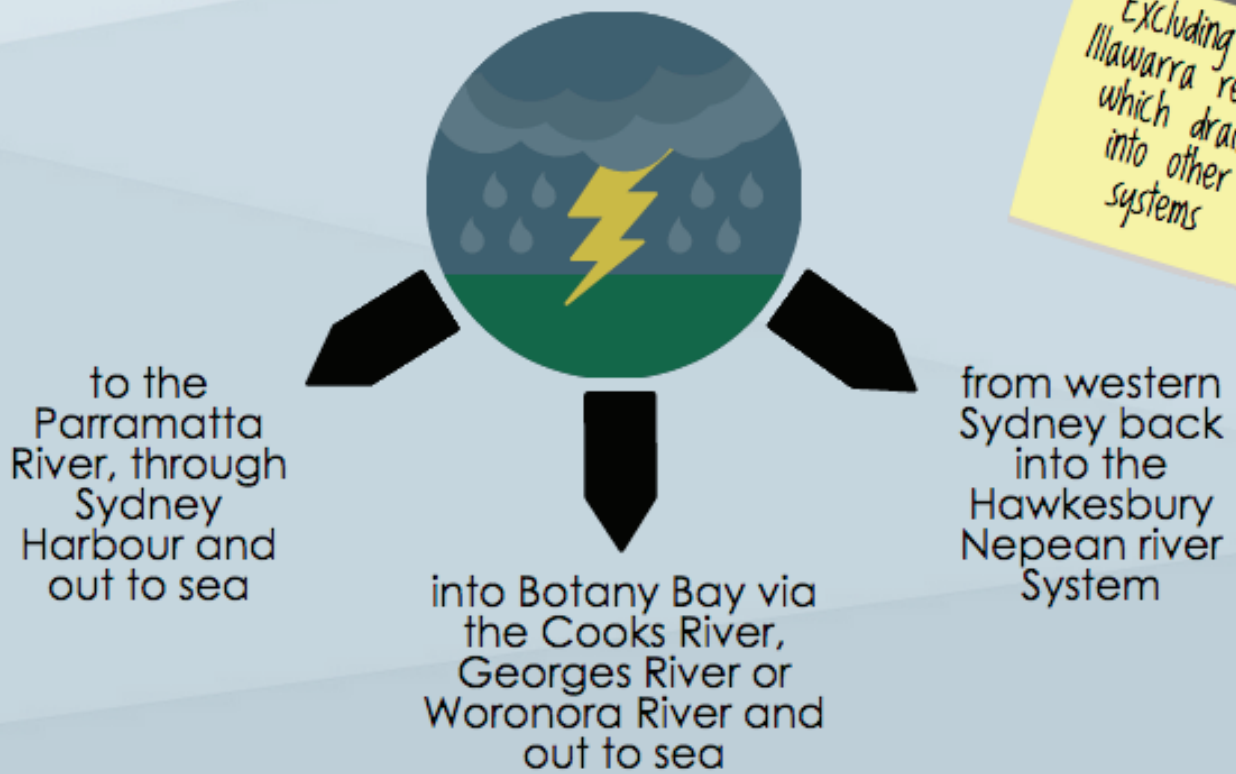
# WETLANDS

Sometimes storm water will be filtered through wetlands. It uses natural ecosystem processes to strip the pollutants from the storm water, before they settle in sediment at the bottom.

Cup and Saucer Creek along the Cooks River is one such wetland.



## In Sydney's metropolitan area storm water ends up in one of three receiving waters



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