ISSUE 3
OCTOBER 2015

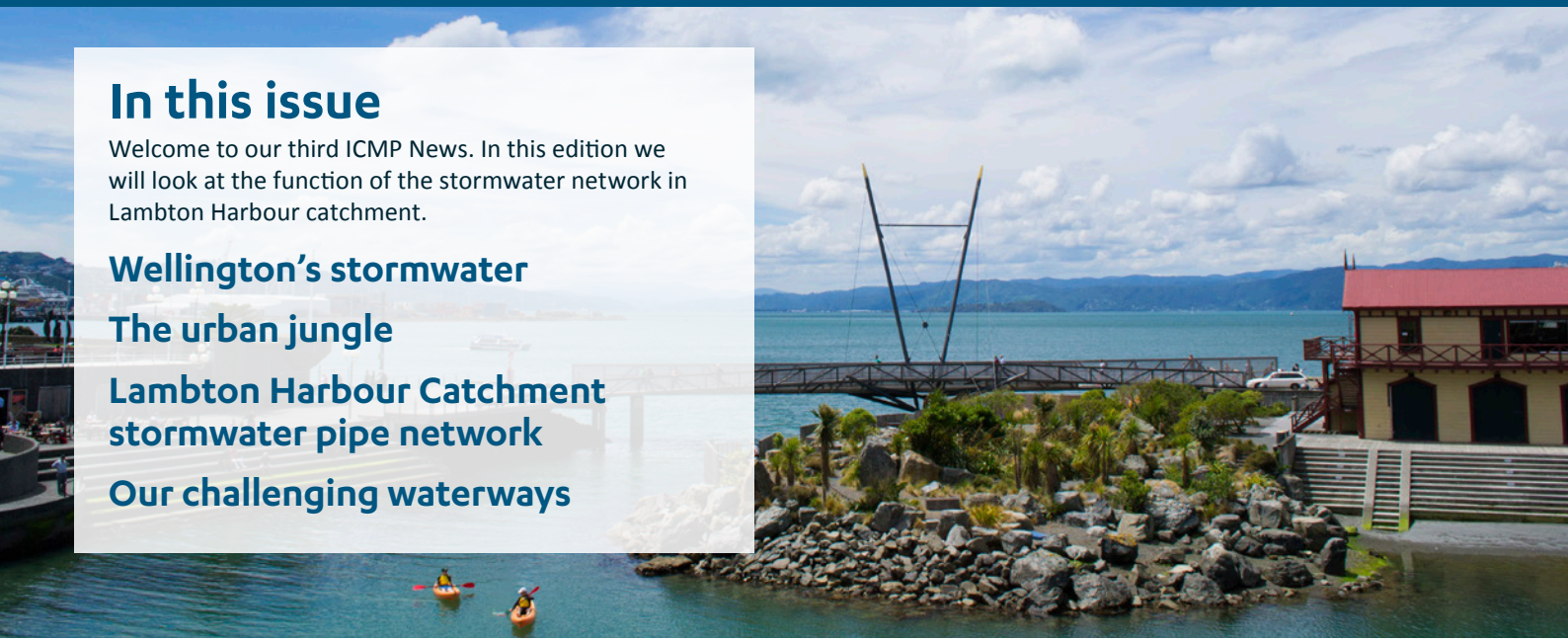
community conversations connecting

Wellington Water

Absolutely Positively Wellington City Council
Me Heke Ki Pōneke

Wellington City ICMP NEWS

An Integrated Catchment Management Plan (ICMP) is a plan for the sustainable management of fresh and coastal water and ecosystems.



In this issue

Welcome to our third ICMP News. In this edition we will look at the function of the stormwater network in Lambton Harbour catchment.

Wellington's stormwater

Wellington's public stormwater system has developed over the last 130 years or more. While there are still some remnants of the open watercourses and streams in reserves and other parts of the city, most areas are serviced by piped stormwater drains.

The current stormwater network comprises a complex gravity system within 1367 hectares of the Lambton Harbour catchment area. This conveys almost 18 million cubic meters of stormwater every year from impervious surfaces such as buildings, roads, urban areas and open spaces into coastal waters.

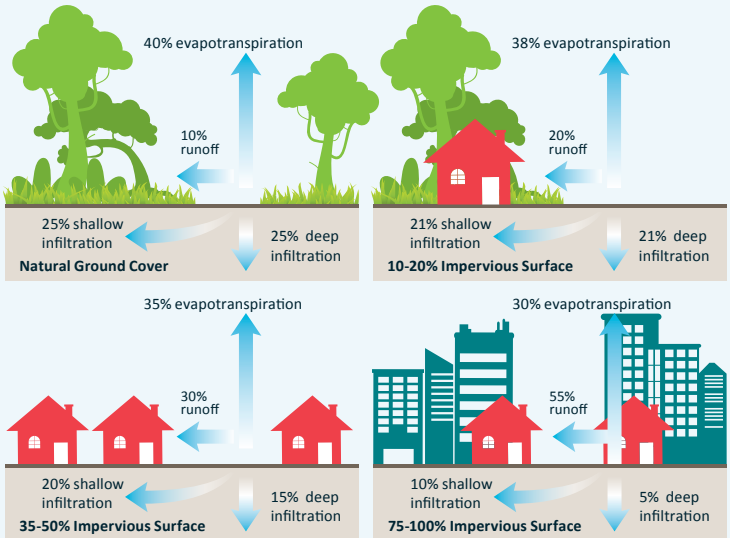
In other words...

Each year; on average, about 1270mm of rain falls on Wellington City. That's about 762,000 litres of rainwater falling on to a land area of approximately 600m^2 (an average sized section) and enough water to:

- take over 10,000 ten-minute showers - more than 25 showers per day!
- flush the average toilet 127,000 times - that's every 4 minutes!
- fill the average bath over 5550 times - taking 15 baths per day!

In fact, the average household uses about a quarter of this amount for all its drinking, cooking and washing needs each year.

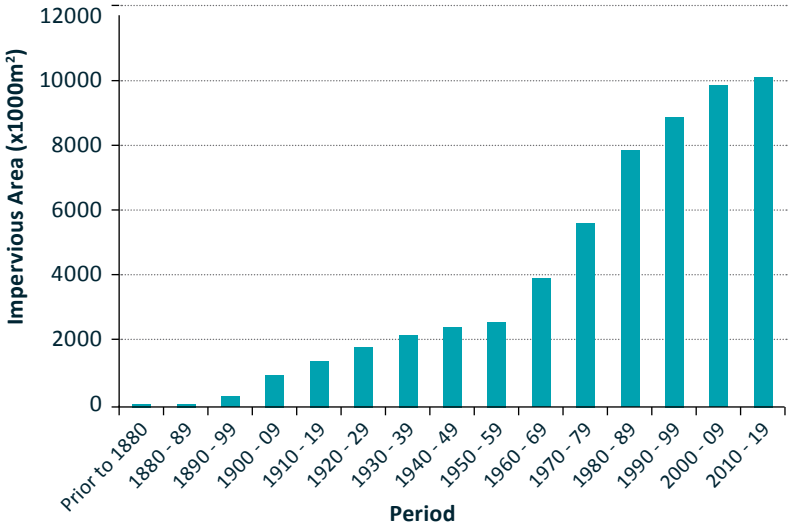
In reality any stormwater runoff will either infiltrate (soak into) the ground or find its way into a stormwater network and flow into a stream or harbour. This picture shows the proportion of potential infiltration and surface runoff in relation to catchment imperviousness (hard surfaces).



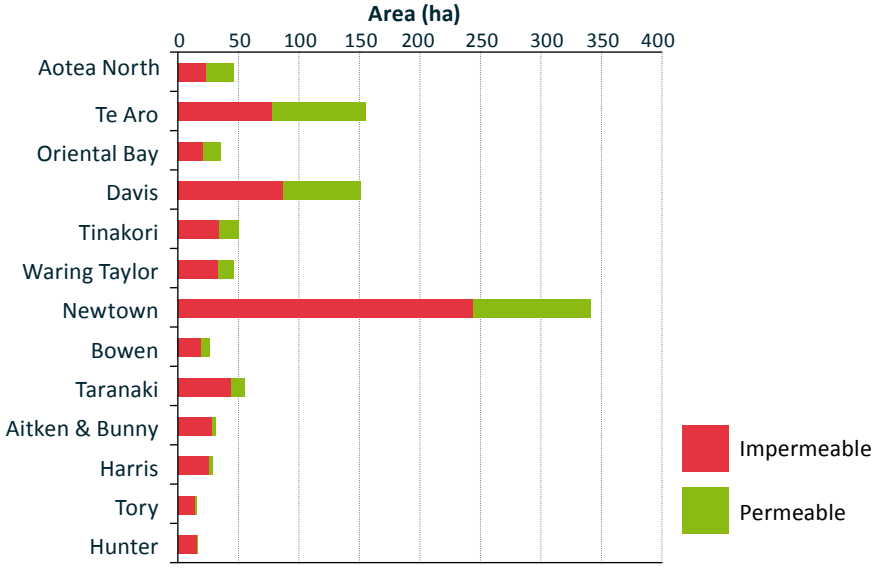
Reference: Paul MJ & Meyer JL, 2001. The ecology of urban streams, Annual Review of Ecology & Systematics 32:333-365

The urban jungle

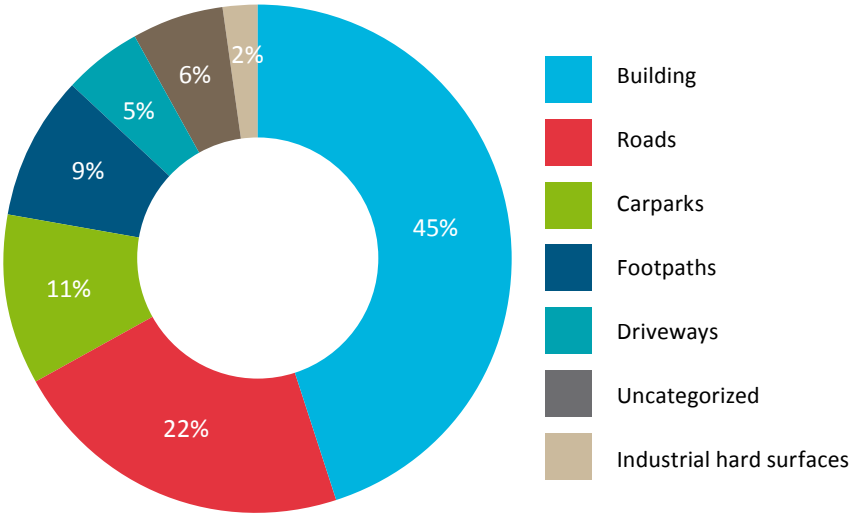
A rapid increase in residential development due to population growth has seen green land being used for development. The Wellington City's development trend is shown in the graph below. A more detailed description is provided under 'Our challenging waterways', page 4.

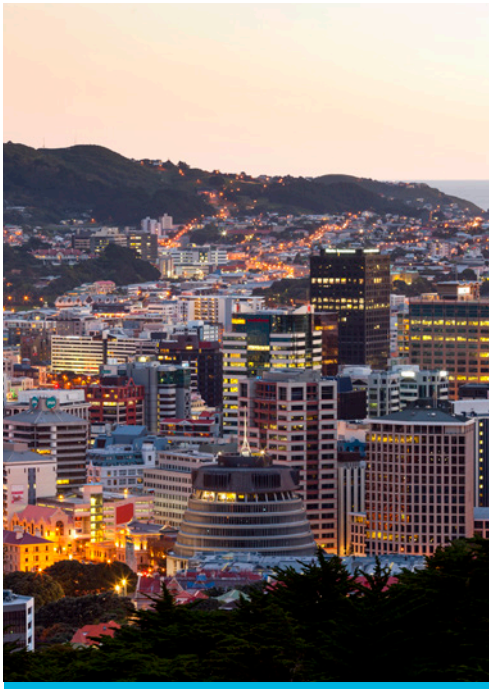


Pervious and impervious areas for each sub-catchment



Distribution of imperviousness is:





An impervious area of the catchment is built up with buildings, roads, driveways, footpaths, sealed carparks, roads and industrial hard-shed areas.

These graphs show that 65% of the Lambton Harbour Catchment is impervious (excluding conservation areas).

The original occupants of the Wellington area were the Taranaki Whānui and Ngāti Toa Maori people. This changed in the 1840s when settlers from Europe moved into the Lambton Harbour area. In 1855 an earthquake struck the area, raising the coastline and creating flat land for settlement in and around the harbour. Land was reclaimed to form what is now the central city. Rapid residential development took place between the 1880s and 1920s, spurred by commercial and industrial growth and improved access. Growth slowed in the 1930s until the post-war years when further expansion occurred. Gentrification and renovation of the inner city took place in the late 1970s, including transformation of the waterfront.

Lambton Harbour catchment stormwater pipe network

As grassland areas have reduced, the need for a better network of stormwater pipes to handle the increased runoff from buildings and roads has increased.

These pipes replace many smaller streams, during very high storm peaks they often discharge into streams that remain.

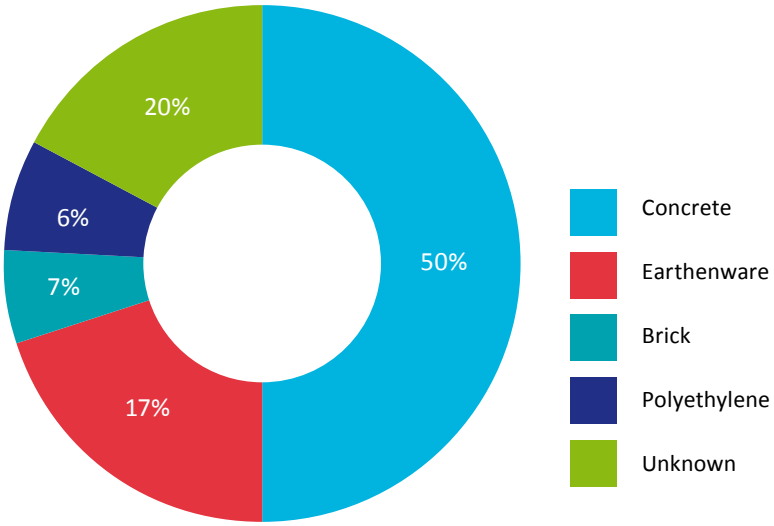
The current stormwater network comprises a complex gravity system of reticulated pipes, culverts, catch-pits, grit traps, secondary overland flow paths and streams within the catchment area.

Pipes

Over the years a variety of pipe material has been used, varying in size from 100mm to 3000mm. The older type pipes were made of earthenware, stone or brick but many of these have now been replaced by concrete. Pipe removal (replacing old pipes with new) and upgrade (increasing pipe capacity) are carried out according to asset management and council planning requirements.

Te Aro culvert – Ovoid shape brick culvert constructed in the 1930s

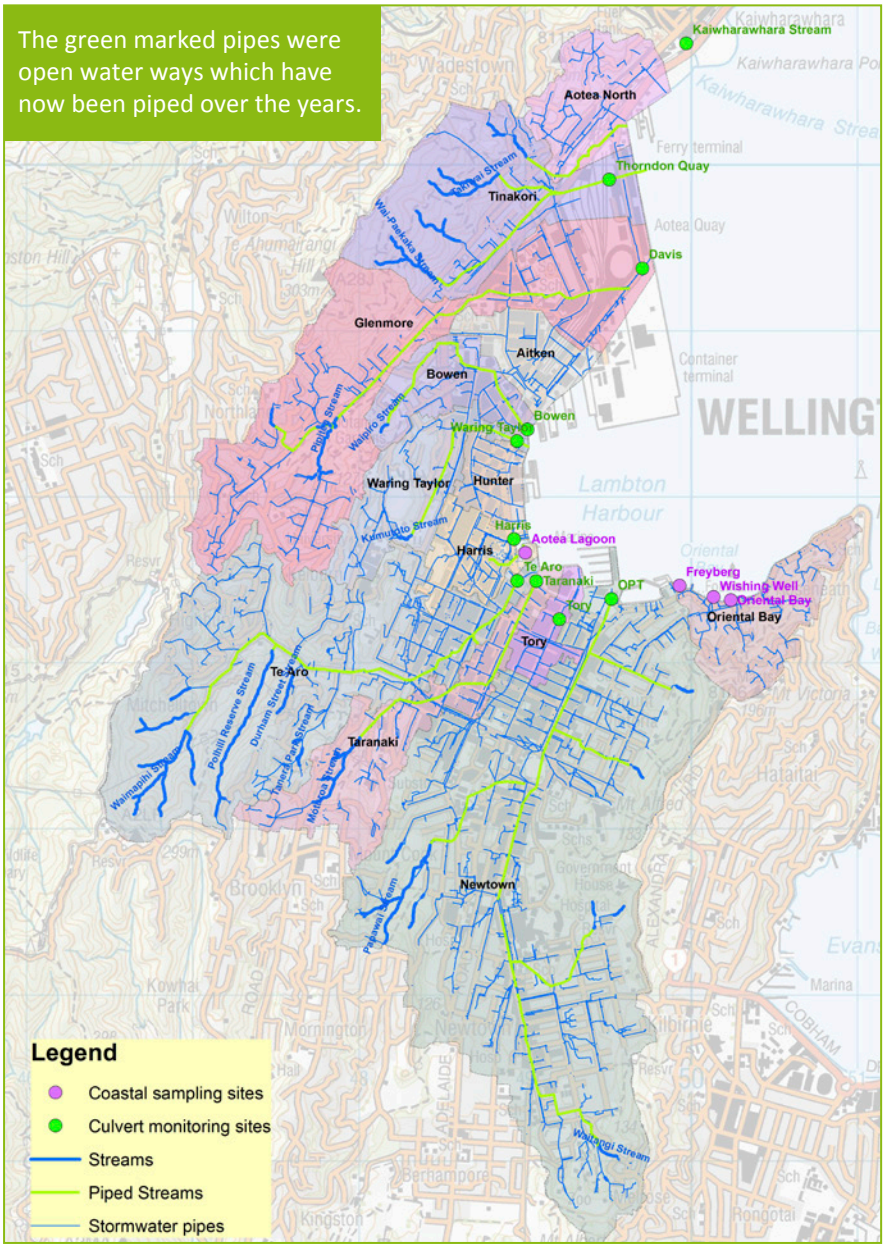
The proportion of stormwater pipe materials within the catchment



Public stormwater network facts:

- There is about 150km of piped systems and approximately 12km of open semi-urban watercourses. About 14km of streams have been piped over the years as a result of land development.
- Approximately 3912 manholes are included in the stormwater network. These are used as access points for making connections, inspections or performing maintenance on the underground pipe network.
- 17 grit chambers located in the stormwater network collect sand, suspended and floating material which is washed down with storm runoff. These structures are used as stormwater treatment devices.
- Stormwater inlet structures - used to collect stormwater runoff - are routed through underground pipes, allowing sediment and debris to settle. There are two main types - inlet sumps and gridded structures. Usually inlet sumps are pre-treatment devices which remove sediment and other pollutants before it enters the storm drainage pipes. These require routine maintenance to retain the storage available in the sump to capture sediment and floatable debris. WCC roading services team cleans them quarterly. Inlet gridded structures are located at the end of a watercourse or entrance to a stormwater pipe. They are inspected and cleaned on a routine basis by a drainage maintenance contractor.
- Stormwater outlet structures are most commonly open outlets to water courses or the ocean. There are a few gridded structures intended to prevent floating debris from washing into the sea. Most of the major outfalls along Lambton Quay area are under water.

Our challenging waterways



To date we have:

- Mapped overland flow paths within the Wellington City Council catchments.
- Assessed stream networks, ecological values and identified potential areas for improvement.
- Compiled flood incident reports.
- Inspected and measured more than 400 manholes and 900 sumps.
- Sampled stormwater quality from outfalls at 10 locations in Lambton Harbour and a total of 22 locations to date.
- Developed computer hydraulic models of the stormwater networks which include modeling open water courses and overland flow paths.
- Prepared location maps of stormwater treatment and pre-treatment devices.

Imagine Wellington's landscape before the arrival of human settlers. Dense forest and bush punctuated by mountains, with countless small streams winding down to the coastline. The city is vastly different today.

One of the biggest challenges is how to manage urban stormwater – rainfall that runs off the city's roofs and roads: we need to deal with the sheer quantity and, perhaps surprisingly, the quality of this stormwater. The majority of open watercourses in the Lambton Harbour catchment are ephemeral channels which means they only hold surface water following significant rainfall. There are a few permanent ones which are the un-piped remnants of the natural streams that drain the catchment. The most prominent of these are Pipitea Stream and its Pukatea Stream tributary (in the Botanic Gardens), Moturoa Stream (in Central Park), Papawai Stream (in Prince of Wales Park), and Waimapihi Stream (Waimapihi Reserve). Pipitea Stream (and Pukatea Stream) and Moturoa Stream, are easily accessible by the public. The Pipitea Stream (and its tributaries) in the Botanic Gardens is probably the most visited watercourse in Wellington's CBD and much of it flows through one of the last pre-European forest remnants in Wellington.

Waimapihi Stream (left) and Moturoa Stream (right).

In our next edition we will be addressing contaminants: how they are caused and how we monitor and control them.

For more information or to contact us:
visit **www.wellingtonwater.co.nz** or phone **04 910 3800**

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