

# Cooks River Sustainability Initiative

## Upper Wollie Creek Subcatchment Management Plan

### - Canterbury Council



**City of Canterbury**  
City of Cultural Diversity

**OurRiver**  
cooks river sustainability initiative



This document is a result of Canterbury Council's involvement in the OurRiver - Cooks River Sustainability Initiative. The OurRiver project is an initiative of the Cooks River Foreshore Working Group and is funded by the NSW Environmental Trust's Urban Sustainability Program from 2007 to 2010. It is a partnership between Ashfield, Bankstown, Canterbury, City of Sydney, Hurstville, Marrickville, Rockdale and Strathfield councils, and Monash University. The project is focusing on six local areas (known as subcatchments) and is working with councils and communities to develop subcatchment management plans that reflect local conditions, ideas and needs. The aim of the subcatchment management plan is to improve the health of the Cooks River and to involve local communities in planning and implementing more sustainable water management solutions.

A community water vision and associated goals and actions (page 12-15) were developed by members of the Upper Wolli Creek Subcatchment community at workshops held in March, April and May 2009. The comments and ideas provided by the community as part of this planning process have formed the basis of the sustainable water options presented in this Plan. The Upper Wolli Creek Subcatchment Management Plan will be integrated into City of Canterbury's Environmental Management Plan (EMP) which will identify priorities, responsibility and financial year for implementation of these options. The EMP will also assist staff identify the water related options that can be integrated into their works program during the planning and budgeting stage.

The Upper Wolli Creek Subcatchment community's future water vision is shown below:

*"In 2050 our community understands and is aware of the importance of water and energy conservation. Our public spaces and streets are clean and cared for by all. Waste and rubbish are no longer a problem. Our catchment is planted with native vegetation and there are roadside gardens which clean the stormwater before it flows into Wolli Creek. The amount of stormwater that runs off the catchment is reduced through smarter urban design. Wolli Creek is safe to swim in again. All our homes and buildings, including those used by industry, are sustainable and designed to capture, treat, store and reuse all water sources. Energy is generated locally from renewable resources to meet our communities demand."*

## Upper Wolli Creek 2050 Community Water Vision

*This document was prepared in July 2010 by Kate Christianson and Sarah Kamarudin, OurRiver - Cooks River Sustainability Initiative and Nell Graham, Team Leader - Environmental Issues, Canterbury Council. The authors would like to acknowledge the input and assistance provided by Canterbury Council staff, Upper Wolli Creek Subcatchment residents and other stakeholders who participated in interviews, attended meetings and workshops, and provided valuable information and support along the way.*

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Front Cover: Clockwise from top left corner: 1) Wolli Creek Reflections by Barry Porter, 2008; 2) Rainwater harvesting and reuse scheme, Strathfield Municipal Council NSW; 3) Permeable paving; 4) Streetscape raingarden at Victoria Park, Zetland; 5) Wolli Creek Channel, Kingsgrove NSW.

NB: The ABS 2006 Census Data used in this booklet was collated prior to the finalisation of the Upper Wolli Creek Subcatchment boundary, therefore the figures for the current Subcatchment may vary slightly from those shown in the pages of this booklet.

**Catchment:** An area bounded by high points such as hills that funnel rain and run-off water to a creek, river, lake or ocean. Creeks and streams carry much of the water in natural catchments, but in urban catchments creeks and streams have often been replaced by stormwater drains.

**Greywater:** Water that has been used (for domestic purposes) in the laundry, shower, bath, hand basins and is re-used for purposes such as watering the garden.

**Rainwater:** Water that falls as rain.

**Stormwater:** Water (usually rainwater) that flows over surfaces and makes its way into stormwater drains.

**Subcatchment:** An area that collects and funnels rainwater to one waterway (i.e., a smaller catchment within a catchment). The water flowing from many subcatchments comes together in a creek, river, lake or ocean. OurRiver is focusing on six subcatchments within the Cooks River catchment.

**Sustainable Urban Water Management (SUWM)\*:** The holistic management of water (including water supply, rainwater, stormwater and wastewater) which minimises the import of large quantities of potable (drinking quality) water into cities and the discharge of wastewater and stormwater to urban waterways and oceans. SUWM includes Water Sensitive Urban Design (see definition below) but is a broader term used to include non-structural elements related to water management such as policy, funding, education and community engagement.

**Wastewater:** Any water that has been adversely affected in quality by human influence. It includes liquid waste discharged by domestic residences, commercial properties, industry, and/or agriculture and can encompass a wide range of potential contaminants and concentrations.

**Water Cycle:** Describes the continuous movement and transformation of water (vapour, liquid, solid) on, above and below the Earth's surface. The urban water cycle typically includes how water enters, is used and leaves an urban setting (USGS 2009).

**Water Sensitive Urban Design (WSUD)\*:** Integrates urban planning with the management, protection and conservation of the urban water cycle. WSUD ensures that urban water management is sensitive to natural hydrological and ecological processes (Wong 2007). WSUD aims to protect natural systems (e.g., creeks and rivers), protect water quality (reduce pollution), reduce demand on drinking water supplies and reduce the intensity of stormwater flows to waterways. Some examples of WSUD are:

- **Harvesting rainwater or stormwater** – lessens the demand on imported drinking water supplies (e.g., water from Warragamba Dam) and also reduces the amount of run-off and pollution that reaches our local waterways (creeks, rivers and oceans).
- **Raingardens and swales** – mimic processes that take place in more natural non-urban areas, they can slow or reduce the flow of stormwater reaching waterways, increase the amount of water that soaks into the soil and filter pollutants from stormwater.

*\*Various definitions exist for Sustainable Urban Water Management and Water Sensitive Urban Design. In this document the two terms are used according to the definitions on this page.*



*WSUD streetscape on Rawson Street, Croydon Park. Photo courtesy of Ashfield Council.*



*Water feature that uses filtered rainwater, Kogarah Town Square. Photo courtesy www.wsud.org*



## PURPOSE OF THIS PLAN

This Plan provides information on the social and physical characteristics of the Upper Wolli Creek Subcatchment and also describes how water is currently managed in the Subcatchment area. The results of the planning process undertaken as part of the OurRiver project, and options for improving water management in this area are also detailed within this plan. This document is designed to be used by Council, the community and other stakeholders to help facilitate the sustainable management of water resources in the Upper Wolli Creek Subcatchment.

## WHY IS THIS PLAN NEEDED?

Most water used in the Upper Wolli Creek Subcatchment comes from Warragamba Dam and is treated to a drinking quality standard. From summer 2009-2010 up to 15% of Sydney's water supply will come from the Kurnell desalination plant; this water is also treated to drinking quality standard. However only 1% of the high quality imported water is used in the Subcatchment for drinking and cooking - the rest is used for purposes that do not require such high quality water, like watering gardens and toilet flushing. An under utilised water source in Sydney is rainwater. Most rainwater that falls in the Upper Wolli Creek Subcatchment washes directly into Wolli Creek carrying with it pollutants such as litter, and petrol and oil derivatives. This Plan looks at ways to address two problems, increasing demand for water and the poor health of the Cooks River. Refer to page 3 for information on how this Plan fits with the existing water management framework and how it will be used and implemented within Council.

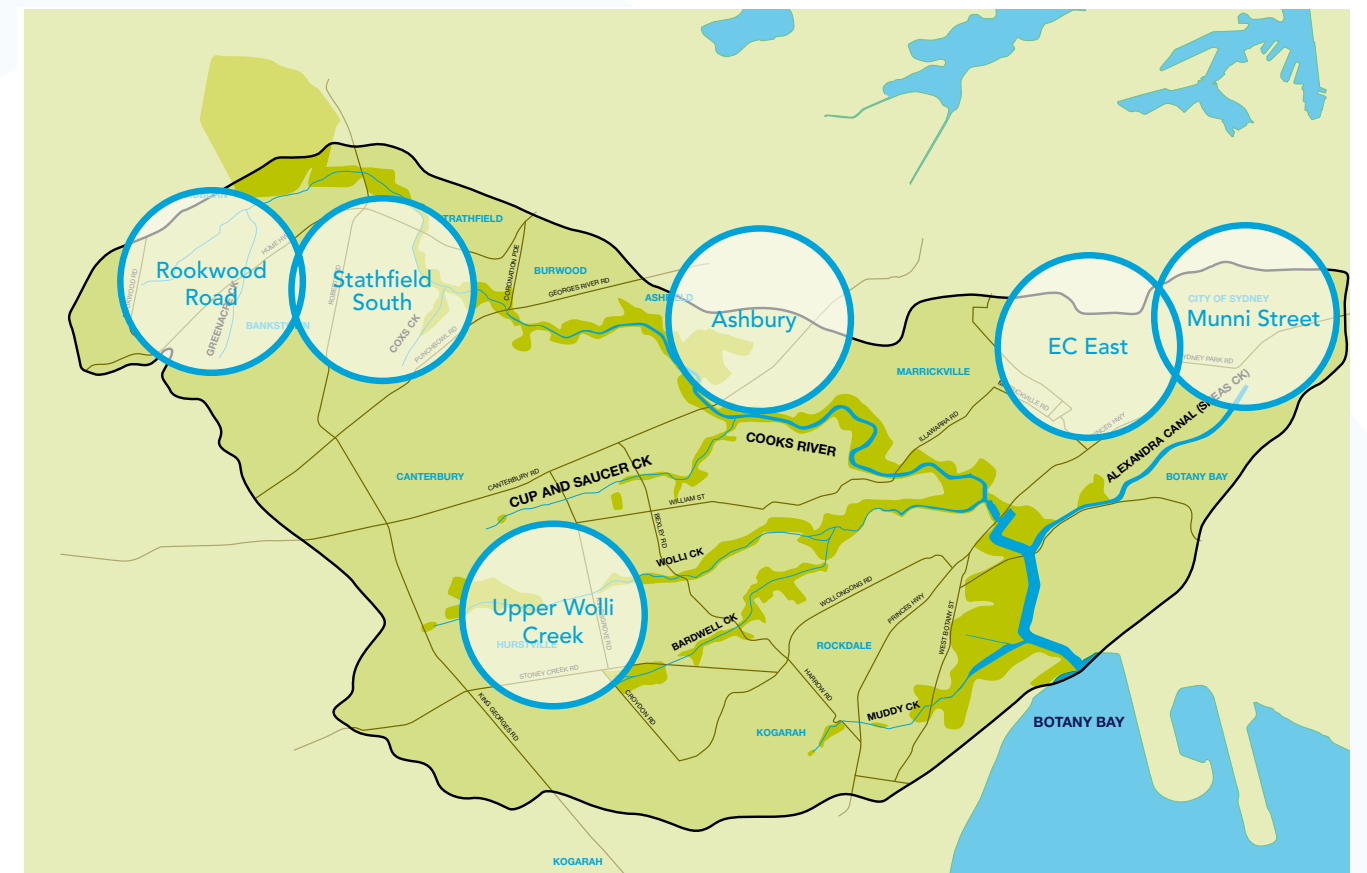
## OURRIVER - COOKS RIVER SUSTAINABILITY INITIATIVE

OurRiver is a research project that is addressing urban water problems in innovative ways to improve the health of the Cooks River, and to increase the use of local water sources such as local rainwater. OurRiver is an initiative of the Cooks River Foreshore Working Group and is funded through the NSW Environmental Trust's Urban Sustainability Program from 2007 to 2010. The project is a partnership between eight Councils (Ashfield, Bankstown, City of Canterbury, City of Sydney, Hurstville, Marrickville, Rockdale, Strathfield) and Monash University.

OurRiver aims to facilitate a catchment-wide shift to sustainable urban water management, and to establish a catchment-wide alliance to support the ongoing rehabilitation of the Cooks River. The project is focusing on six local areas (known as subcatchments) and is working with councils and communities to develop subcatchment management plans that reflect local conditions, ideas and needs. The six OurRiver subcatchments are shown on this page. The OurRiver planning process is different from traditional processes due to its collaborative approach involving council's residents and other stakeholders, in its analysis of social and physical characteristics at the subcatchment scale, and its review of each councils' current approach to water management.

## COOKS RIVER CATCHMENT

Wolli Creek is the largest of four major tributaries to the Cooks River. The Cooks River starts in Bankstown and flows 23km east to discharge into Botany Bay. The River is regarded as one of the most polluted urban rivers in Australia - a result of its historical use as a drain by industries along the River and the more current problems of polluted stormwater run-off from urban areas, and sewage overflows. The Cooks River Catchment covers approximately 11,000 hectares and is home to more than 500,000 people (CRVA 2009). There are 13 local councils within the Catchment.



The Cooks River Catchment showing the location of the six OurRiver Subcatchments.

The planning process undertaken as a part of the OurRiver project builds on rigorous research into urban water management in New South Wales (Brown 2003). The research detailed three key elements that were necessary for ensuring successful implementation of sustainable urban water management:

1. Due to the complexity of urban water problems, the development of effective solutions requires the involvement of a range of professionals from engineers to planners to ecologists and social scientists.
2. The people affected by urban water problems, including residents, businesses, community groups and government departments need to work more closely together to identify solutions.
3. Plans must be developed on a scale smaller than a whole river catchment in order to account for the variation in communities and physical features along the river and to enable the use of practical 'locally grown' solutions to urban water problems.

To address the elements outlined above, the planning process for the Upper Wolli Creek Subcatchment entailed:

- Collaboration within Council - staff from different departments including Planning, Design, Parks and Communications were involved in the planning process;
- Collaboration with local residents, businesses, community groups and government departments to develop a common future vision for the Subcatchment (see below) and interim goals and actions (see pages 12-15) in order to help achieve the vision;
- Planning on the Subcatchment (i.e., neighbourhood) scale, which allowed for detailed social, physical and organisational profiling to ensure solutions and strategies developed are right for the Subcatchment and its community.

## Upper Wolli Creek 2050 Community Water Vision

*"In 2050 our community understands and is aware of the importance of water and energy conservation. Our public spaces and streets are clean and cared for by all. Waste and rubbish are no longer a problem. Our catchment is planted with native vegetation and there are roadside gardens that clean the stormwater before it flows into Wolli Creek. The amount of stormwater that runs off the catchment is reduced through smarter urban design. Wolli Creek is safe to swim in again. All our homes and buildings, including those used by industry, are sustainable and designed to capture, treat, store and reuse all water sources. Energy is generated locally from renewable resources to meet our communities demand."*



Photos from left to right: 1) Upper Wolli Creek planning forum, 2) residential rainwater harvesting, 3) Upper Wolli Creek planning forum, 4) typical house in the Subcatchment. All photos courtesy OurRiver.



## How Does Subcatchment Planning Fit with Existing Policy?

### Federal

The National Water Initiative (NWI) is an agreement between the Federal Government and all state and territory governments. The NWI includes actions related to improving the capacity of all relevant stakeholders (including governments and communities) to achieve Sustainable Urban Water Management. Subcatchment planning is about councils, residents and other stakeholders working together to achieve this aim. Subcatchment planning also aims to deliver the following NWI objectives:

- provide healthy, safe and reliable water supplies;
- increase water use efficiency in domestic and commercial settings;
- encourage re-use and recycling of wastewater where cost effective;
- encourage innovation in water supply sourcing, treatment, storage and discharge.

### State

There are a number of state level policies and plans concerned specifically with water, catchment management and local planning. This includes:

- NSW Government Integrated Planning and Reporting
- NSW Government Water for Life Metropolitan Water Plan
- Sydney Metropolitan Catchment Management Authority (SMCMA) Catchment Action Plan

Subcatchment planning shares the following aims with these plans:

NSW Government Integrated Planning and Reporting

- Integrated planning with physical, social and organisational characteristics taken into account
- Increased stakeholder engagement with councils, state agencies, residents and other stakeholders working together on long term plans
- Improved connection between councils' and communities' visions

Water for Life Metropolitan Water plan

- Securing a sustainable and secure water supply through recycling and water efficiency
- Protecting rivers and their catchments

SMCMA Catchment Action Plan

- Improvement in condition of riverine systems and important wetlands
- No decline in the condition of marine waters and ecosystems
- More people, communities and organisations have increased capacity to contribute to natural resource management
- Increase in native vegetation

### Council

#### Canterbury City Council

The Upper Wolli Creek Subcatchment Management Plan will be integrated into City of Canterbury's Environmental Management Plan (EMP). The EMP is prepared in consultation with the Environmental & Sustainability Advisory Committee and sets the strategic direction for environmental sustainability for Council. The EMP is reviewed and updated annually and is a key document supporting Council's annual City Plan which outlines the actions that will achieve our goals each financial year.

The Environmental Management Plan will list actions identified in the Subcatchment Management Plan that are planned for that year. The EMP identifies priorities, responsibility and financial year for implementation and assists staff identify the water related actions that can be integrated into their works program during the planning and budgeting stage.

A copy of the Subcatchment Management Plan will also be made available to staff who are involved in planning for major upgrades of roads, streetscapes, public open spaces and parks as well as sustainability education. Staff will then be able to identify the best funding sources for implementing the plan.



Raingarden, Buckland St, Chippendale NSW. Photo courtesy [www.wsud.org](http://www.wsud.org).



The complexity of urban water problems requires localised solutions. It is therefore necessary to understand local characteristics as part of any urban water planning process. Detailed research was undertaken to understand the physical characteristics of the Upper Wolli Creek Subcatchment, its community and the organisations relevant to water management in the area. This will assist in the development of solutions that reflect local conditions, views and needs.

The Upper Wolli Creek Subcatchment is positioned across three local government areas: Canterbury, Hurstville and Rockdale. The Subcatchment area was collectively chosen by staff from the three councils to:

1. Encourage further collaborative planning between the three councils,
2. Encourage council-stakeholder engagement and
3. Improve the water quality and overall health of Wolli Creek.

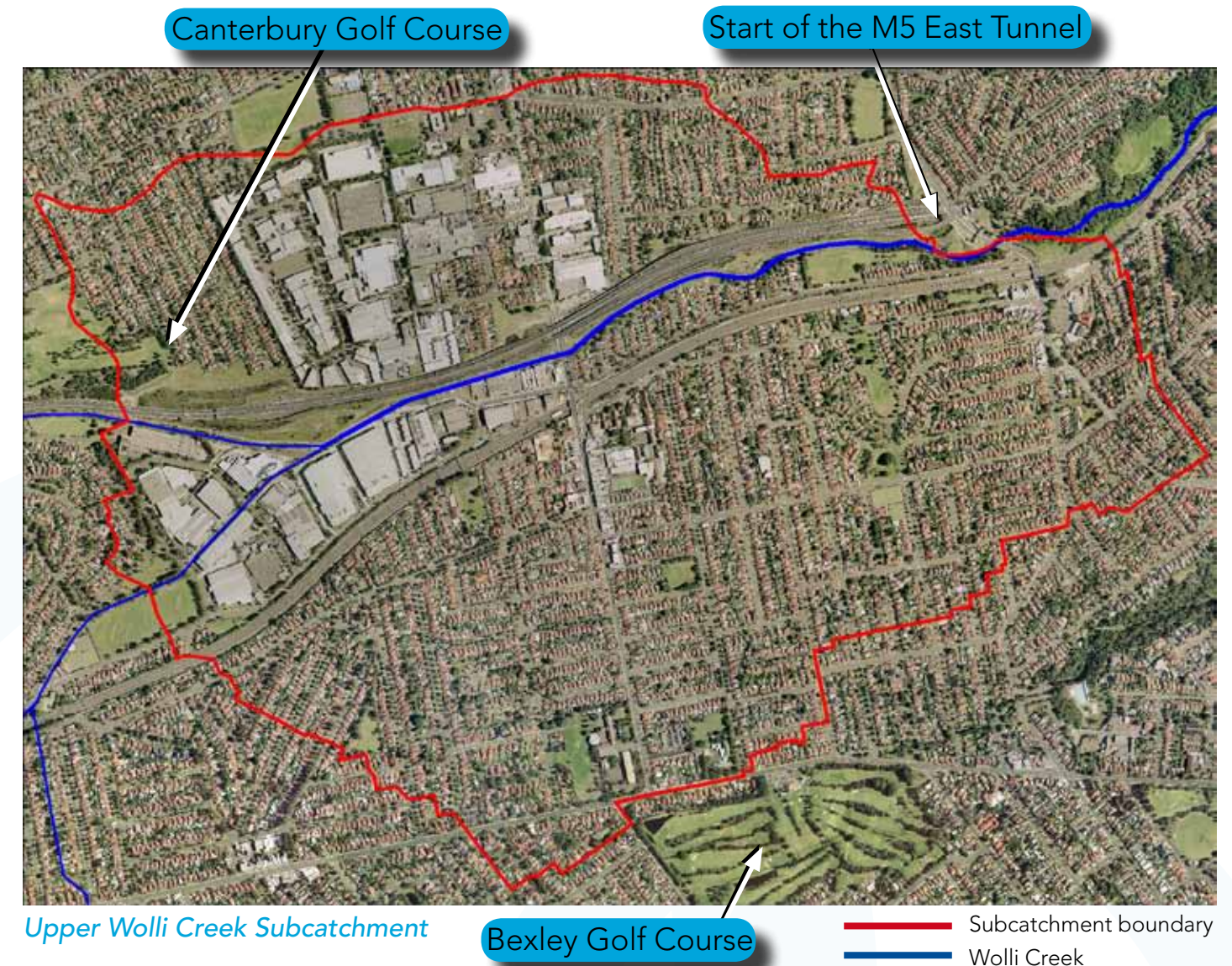
The Upper Wolli Creek Subcatchment occupies 385 hectares and includes the parts of the following suburbs: Kingsgrove, Bexley North and Beverly Hills. The area is roughly bordered by Stoney Creek Road to the south, Homer Street and St Albans Road to the north, Bexley and Illawarra Roads to the east, and Tallawalla Street to the west. Stormwater from this area flows directly into Wolli Creek, which is the largest of four major tributaries of the Cooks River.

Land use within the Subcatchment is predominately residential with a notable amount of industrial development concentrated in the north and western areas of the Subcatchment, and local businesses located primarily along Kingsgrove and Bexley Roads. There are numerous parks, reserves and sporting fields throughout the Subcatchment. The Subcatchment also includes distinct landmarks such as the M5 freeway, the East Hills railway line, Kingsgrove and Bexley North train stations.

According to the Australian Bureau of Statistics 2006 Census:

- 30% of households have a weekly income of \$1,400 or more
- 40% of residents over 15 years old hold a tertiary qualification
- 40% of the population is aged between 25 and 54 years
- 57% of residents speak a language other than English at home
- 51% of residents own their own home, 24% are purchasing their home
- 72% of residents lived at the same address five years before the 2006 Census

For more information on demographics and social research results see pages 8-9.



The Wolli Creek Valley, located immediately down stream from the Upper Wolli Creek Subcatchment, contains one of the largest and most significant areas of bushland in inner southwest Sydney. The Wolli Creek Valley not only provides important habitat for many plant and animal species but it is also an area of cultural and historical significance. This unique remnant of bushland features walking tracks, sandstone escarpments, rich and diverse bird life, wetlands, park areas, heath and woodland forests. Currently eight hectares of the bushland along the Wolli Creek has been declared Wolli Creek Regional Park and is managed by National Parks and Wildlife Service (NPWS). Additional land is in the process of being acquired by NPWS that will see the Regional Park increase in size to 50 hectares (WCPS 2009).



# Subcatchment Water Budget

The Subcatchment water budget shows the water entering the area from rainfall and from Sydney's primary drinking water supply at Warragamba Dam (potable water). This diagram also shows how the water is used and where it goes after use.

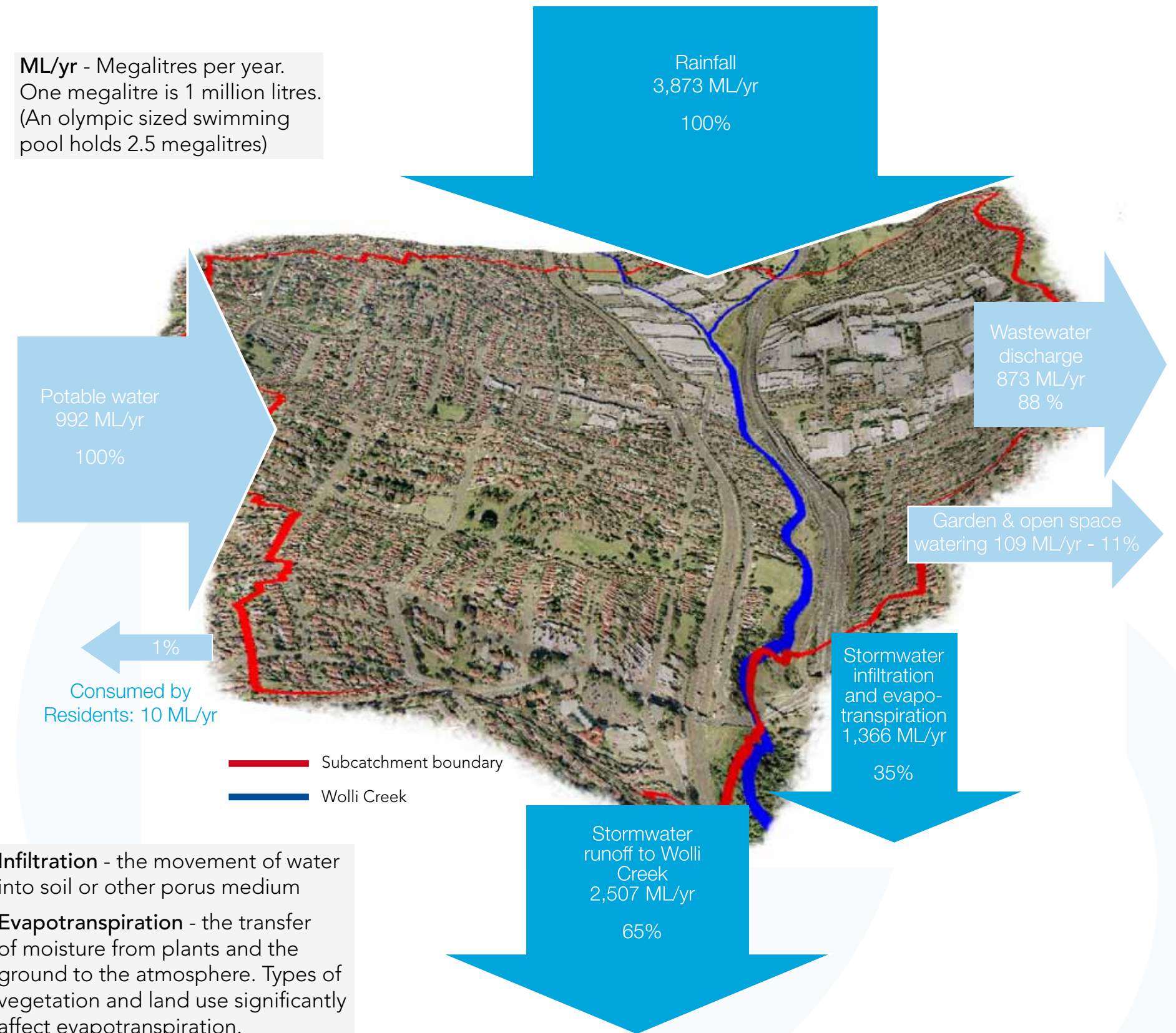
This water budget is based on data from the Bureau of Meteorology and Sydney Water, and stormwater modelling undertaken by the OurRiver team.

The water budget shows the following:

- Only 1% of potable (drinking quality) water is used for drinking and cooking.
- Rainfall is almost four times the amount of imported potable water.
- 65% of rainfall flows directly to Wolli Creek as runoff.

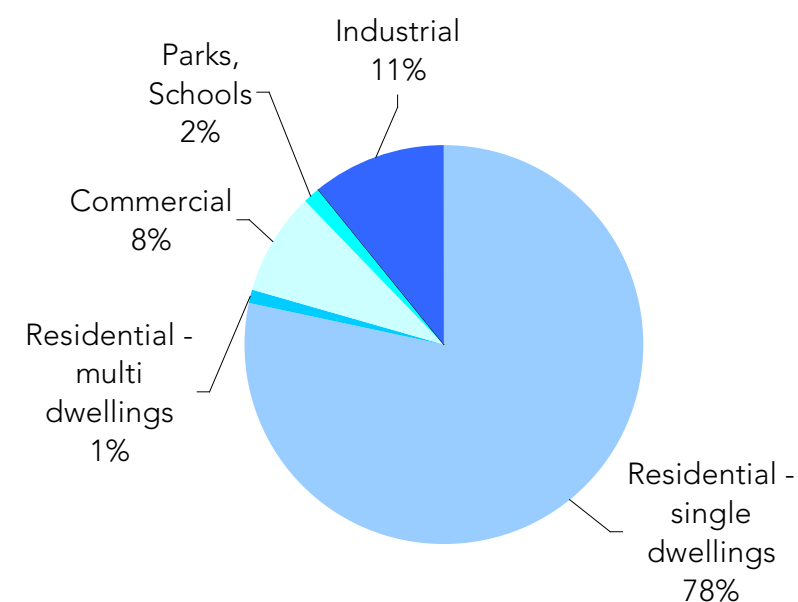
Local rainfall could be utilised for purposes that do not require potable water such as toilet flushing and garden and open space watering.

**ML/yr** - Megalitres per year.  
One megalitre is 1 million litres.  
(An olympic sized swimming pool holds 2.5 megalitres)



**Infiltration** - the movement of water into soil or other porous medium

**Evapotranspiration** - the transfer of moisture from plants and the ground to the atmosphere. Types of vegetation and land use significantly affect evapotranspiration.



**Consumption by land use**

NB: The above image has been distorted in such a way that it reflects the actual topography of the Subcatchment.

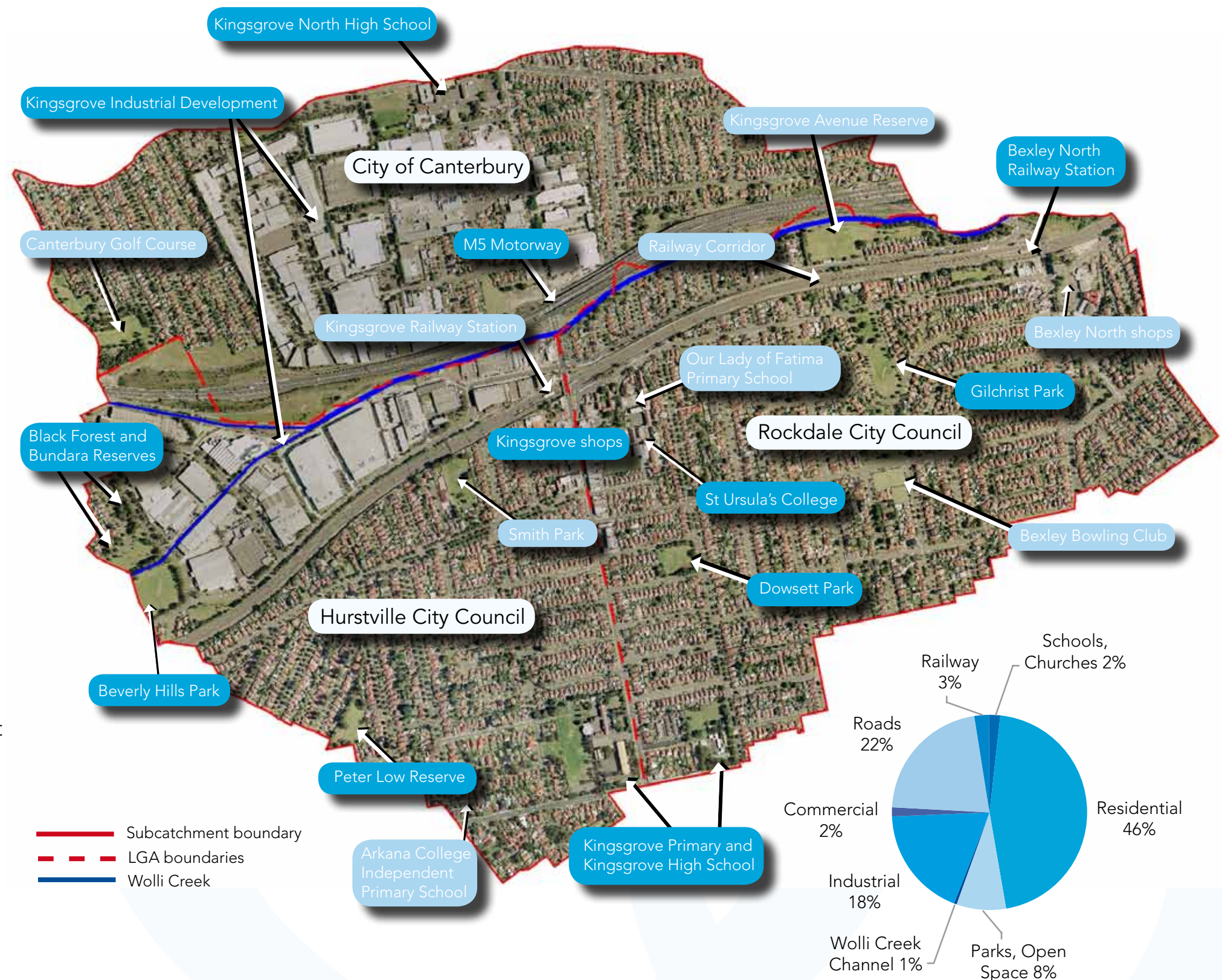


Detailed information about the Subcatchment's physical characteristics has been gathered to help identify opportunities and constraints for the application of Sustainable Urban Water Management practices.

## Land use

Subcatchment area: 385 hectares (ha)

- The Subcatchment is positioned across three local government areas: Canterbury 118ha, Hurstville 120ha and Rockdale 146ha.
- Subcatchment land use includes a mix of residential, industrial, commercial, roads, railway and open space.
- The largest land user in the Subcatchment is residential development; the average residential lot in this Subcatchment is 600m<sup>2</sup>.
- Open space occupies 8% of the Subcatchment, this includes at least 15 parks, reserves and sporting fields, Canterbury Golf Course, the M5 East linear park and land bordering the railway corridor.
- The RTA is a significant landholder, with roads occupying 22% of the Subcatchment area.
- Roads, railway corridors and large developments (e.g., industrial estates) can be barriers to the physical movements of the local population. The M5 freeway, the East Hills railway corridor and Wolli Creek all bisect the Subcatchment in an east-west direction, creating physical barriers within this area.
- The Wolli Creek flows west to east through the middle of this subcatchment. The Creek is a concrete-lined channel for the entire length of the Subcatchment. Stormwater is delivered to the Creek through the Subcatchment's existing pits and pipes network.





## Residential Dwellings

There are approximately 3,532 residential dwellings in the Subcatchment (ABS 2006). The type of dwelling affects the type of water solutions that are possible (e.g., 90% of dwellings in this Subcatchment are separate houses on medium sized lots, which allows space for gardens and rainwater tanks).



**90%**  
Separate houses



**1%**  
House or flat attached to shop



**3%**  
1 storey semi, row, terrace or townhouse



**2%**  
1 or 2 storey block – Flat, unit, apartment



**3%**  
2 storey or more semi-detached, row or terrace



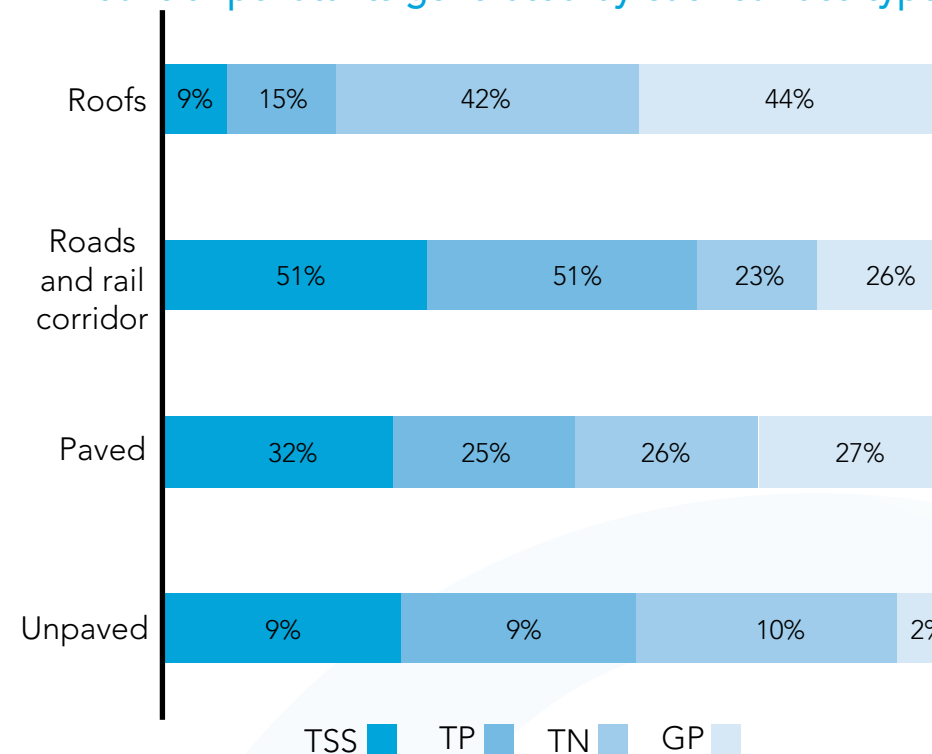
**1%**  
3 or more storey block – Flat, unit, apartment

## Pollution and Sealed Surfaces

A major source of pollution for Wolli Creek is the large area of sealed surfaces. As rainwater runs over these surfaces it collects a variety of pollutants, which it then transports to the Creek and onto the Cooks River.

Approximately 71% of the Upper Wolli Creek Subcatchment is made up of sealed surfaces, which includes roofs, pavement, roads and railway tracks. The large proportion of these surfaces reflects the highly urbanised character of the Subcatchment.

## Amount of pollutants generated by each surface type



**TSS - Total Suspended Solids** - small soil particles, dust, sediment from erosion, etc.

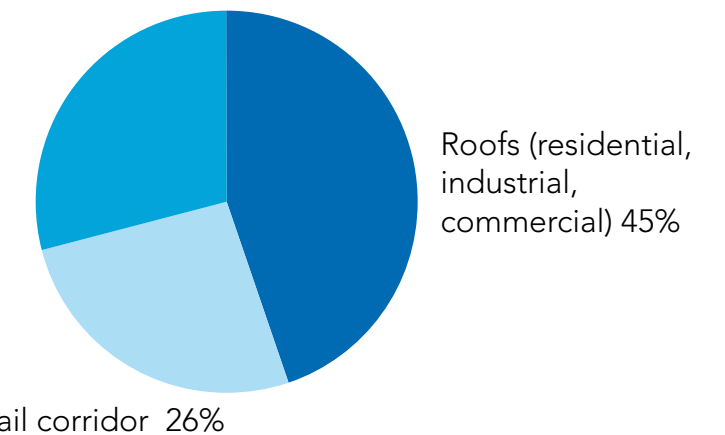
**TP & TN - Total Phosphorous/Nitrogen** - nutrients from natural and non-natural sources including atmospheric dust, soil particles, faeces, decaying plant matter, fertilisers and detergents, vehicle exhaust.

**GP - Gross Pollutants** - litter, plastic bottles, coarse sediments, leaves, etc.



Karingal St, Kingsgrove, 2008. Photo courtesy OurRiver.

Total paved area (residential, industrial, commercial) 29%



## Surface types within the Subcatchment

The table below shows the estimated amount of pollutants currently found in stormwater in the Subcatchment. The Best Practice Stormwater Targets shown are draft targets set by the NSW Government to improve water quality. Based on these targets gross pollutants for example, should be reduced by 90% from the current level of 61,500 kilograms per year to 6,150 kilograms per year (Landcom 2009).

Pollutant	CURRENT average pollution loads (kg/yr) *	BEST PRACTICE Stormwater Targets (% reduction)	TARGET pollution loads (kg/yr)
Gross pollutants	61,500	90%	6,150
Suspended Solids <sup>#</sup>	747,000	85%	112,050
Total Phosphorus	1,380	65%	483
Total Nitrogen	8,710	45%	4,791

\* Estimated with MUSIC modelling software

<sup>#</sup>Note: removal of suspended solids will result in a reduction of heavy metal and hydrocarbon loads.



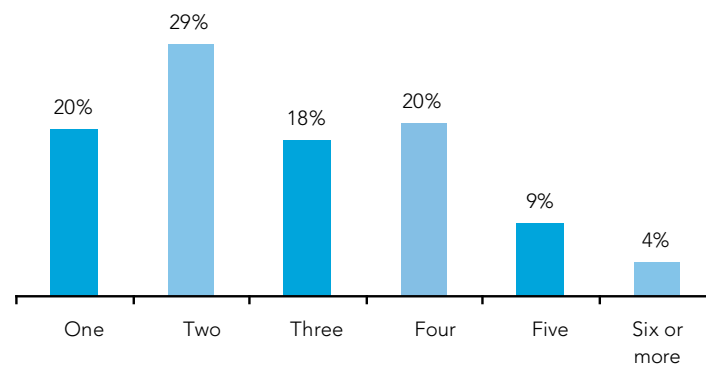
Data from the 2006 Australian Bureau of Statistics Census was used to determine the social make-up of residents in the Subcatchment. In addition, residents and businesses were surveyed to determine current knowledge, attitudes and behavior related to water, including receptivity to water recycling and re-use. The Census data and survey results provide important information that can be used to tailor community engagement and education programs.

## Key Statistics

- Population - 10,175 residents
- Origin - 42% born overseas; China (8%) followed by Greece (5%), Hong Kong (3%) and Italy (3%)
- Languages spoken at home include - 57% non-English; 16% speak Greek, 11% Cantonese, 6% Arabic
- Travel to work - car (72%), train (20%), bus (2%), walk (3%)

## Household Types

How many people per dwelling?:

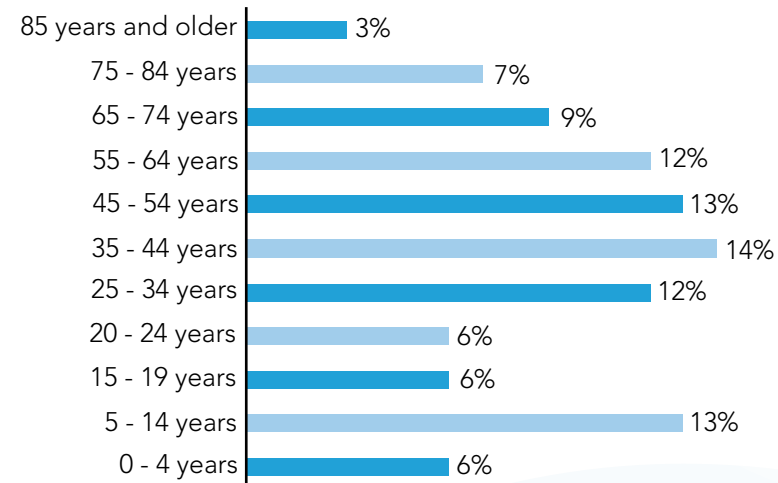


- 31% of families are couples with no children
- 30% of families are couples with children under 15

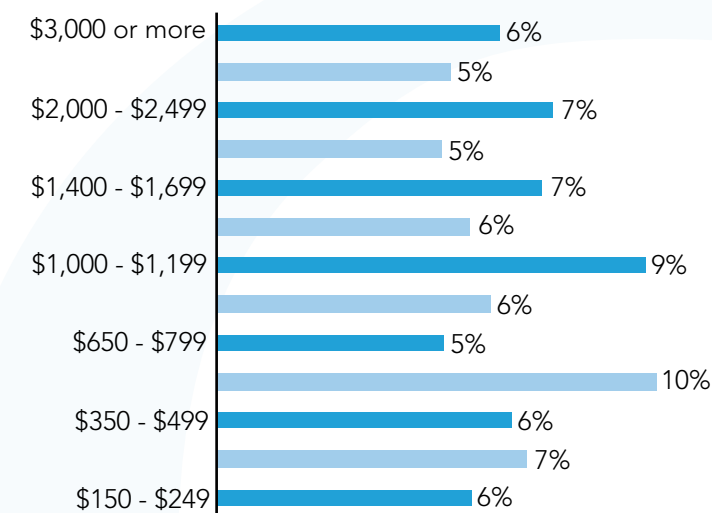
## Time Spent at the Same Address

- 92% of residents lived at the same address one year ago
- 72% of residents lived at the same address five years ago

## Age Distribution



## Weekly Household Income



## Employment

Of the total active labour force (4,607 residents):

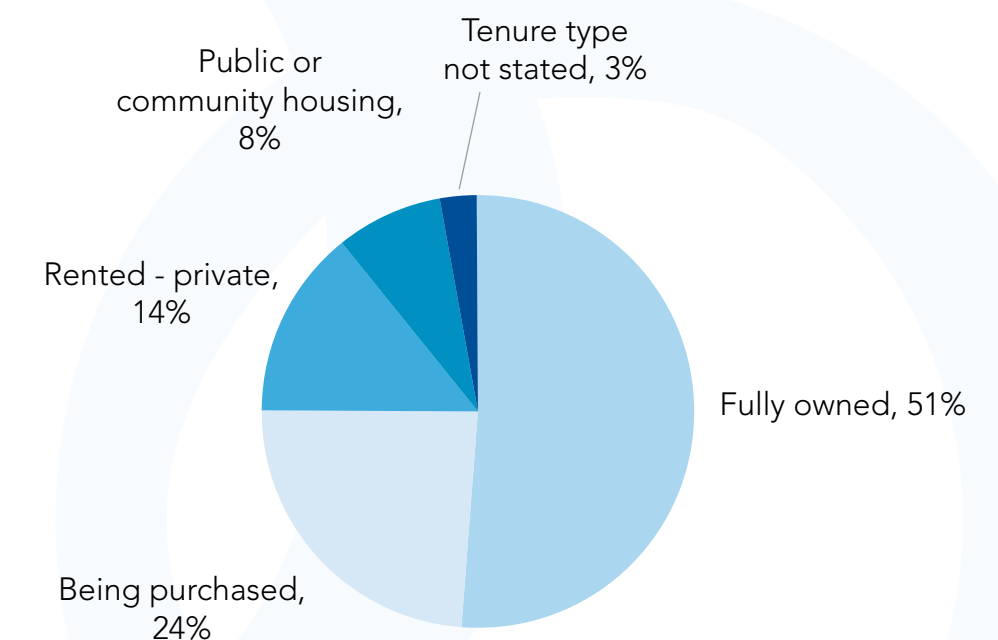
- 68% are employed full-time
- 22% are employed part-time
- 4% are unemployed

## Education

- 28% currently attend an educational institution
- 40% (over 15 years) have a non-school qualification
- 13% have a Bachelor degree or higher
- 17% have an Advanced Diploma, Diploma or Certificate



Upper Wolli Creek Water Wise Tour, 2009. Photo courtesy OurRiver.



Household tenure within the Subcatchment



## Residential Water Survey

The Residential Water Survey was undertaken in July 2008. 512 completed surveys were returned (14% response rate) providing an indication of the community's current knowledge, attitudes and behavior related to water including their willingness to reuse rainwater and greywater. A summary of the results is shown here.

### Knowledge of Urban Water Systems

- 58% of residents answered correctly when asked where water in street drains normally goes (to the nearest waterway)
- 76% of residents underestimated the amount of water used by an average local household

### Rainwater Harvesting

64 people indicated that they currently use water from their rainwater tank as follows:

- 99% use it for the garden
- 67% use it for washing the car
- 34% use it for toilet flushing

### Greywater Reuse

- 220 people indicated that they currently reuse greywater, 91% of those use it in the garden
- 15 people indicated they had a greywater diversion and/or treatment system installed

### Receptivity to Using Rainwater and Greywater

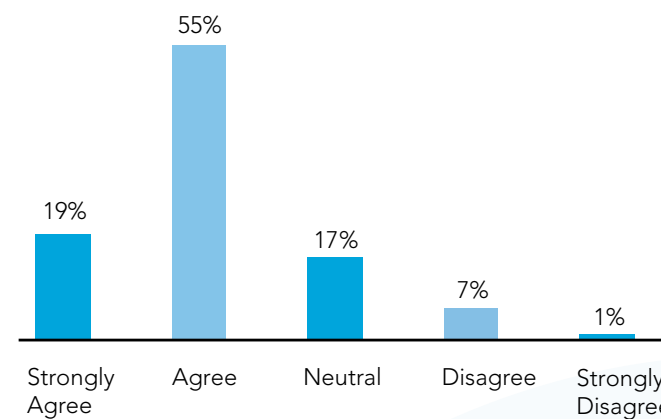
- Over 70% of residents would consider using rainwater and greywater for watering the garden and/or flushing the toilet

### Water Saving Devices

81% of respondents have water saving devices such as showerheads and tap aerators.

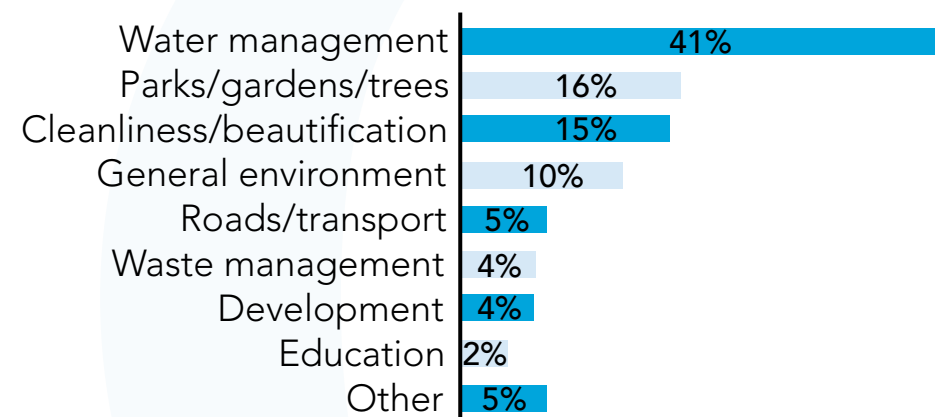
## Attitudes

"Most people want to help improve the health of the waterway environment."



## What major improvement to the environment in your council area do you want to see in the next 20 years?

There were a total of 479 responses to this question, which have been categorised as follows:



As shown above, 41% of responses to this question relate to the management of water.

*NB: The survey results shown are from the entire UWC Subcatchment and therefore include responses from residents in Canterbury, Hurstville and Rockdale LGAs.*

## Business Water Survey

The Business Water Survey was undertaken in June 2009. From an estimated 240 businesses, 211 were successfully contacted and 57 responses obtained (27% response rate). A summary of results is shown below.

### Business type

- 18% of businesses are manufacturing related
- 68% of businesses lease their premises

### Water use

- 82% said that the cost of water to their business was not significant
- 63% use water for domestic purposes only
- Two businesses had rainwater tanks
- 98% would use reticulated recycled waste water if it were available

### Attitudes

Businesses were asked the following question:

"Do you think that government agencies should be mainly responsible for the waterway environment rather than businesses?"

61% disagreed which may indicate that they felt businesses also had some responsibility towards the waterway environment.



Water Wise Tour, 2009. Photo courtesy OurRiver.



## Introduction

There are a range of organisations operating within the Upper Wolli Creek Subcatchment including government agencies, utility companies, schools and community groups. These organisations have responsibilities related to water, development and infrastructure (e.g., government agencies or utility companies), or have power to make some decisions regarding water on their land (e.g., land users and public and private land owners). In order to improve the health of the local waterways, urban water management solutions are required on both public and private land.

## City of Canterbury

The northern section of the Subcatchment above and including the M5 Motorway falls within City of Canterbury local government area (LGA).

## Hurstville City Council

The south western section of the Subcatchment falls within Hurstville City Council LGA. This includes the area south of the M5 and the area west of Kingsgrove Road.

## Rockdale City Council

The south eastern section of the Subcatchment falls within Rockdale City Council LGA. This includes the area south of the M5 and the area east of Kingsgrove Road.

All three councils manage their respective roads, parks, playgrounds and stormwater infrastructure. Councils are also responsible for developing and implementing planning controls and providing services such as waste collection.

## Private landowners

There are a range of private landowners in the Subcatchment. This includes land in residential, commercial and industrial areas. These landowners have the power to make decisions (subject to Council approval) related to water quality, water consumption and flooding controls on their land.

## Sydney Water Corporation

Sydney Water Corporation (SWC) owns and is responsible for the maintenance of the concrete Wolli Creek channel, which receives stormwater from the Subcatchment. SWC is also responsible for infrastructure associated with the delivery of drinking quality water and sewage disposal within Upper Wolli Creek Subcatchment.

## Housing NSW/Community Housing

These organisations provide affordable housing options. Approximately 8% of the dwellings in the Subcatchment are either rented or owned by Housing NSW or community housing organisations.

## RailCorp

RailCorp is responsible for the management and maintenance of the Kingsgrove and Bexley North train stations, the East Hills railway line and all other associated rail infrastructure including the railway corridor.

## Roads and Traffic Authority (RTA)

RTA is responsible for the management and maintenance of the M5 Motorway and the M5 Linear Park (road reserve adjacent to the M5). The RTA also manages and maintains the arterial roads within the Subcatchment, such as Kingsgrove, Bexley and Stoney Creek Roads.

## Schools

There are a number of public and private educational institutions operating within the Subcatchment: Arkana College Primary School, Kingsgrove North High School, Kingsgrove Public School, Kingsgrove High School, St Ursulas College and Our Lady of Fatima School.

## Community Centres

The Kingsgrove-Bexley North Community Centre and Kingsgrove Community Aid Centre operate in the Rockdale and Hurstville LGAs respectively.



*Pedestrian footpath along the northern side of the M5 motorway.  
Photo courtesy OurRiver.*

## Religious Organisations

The following religious organisations have buildings located within the Subcatchment:

- Our Lady of Fatima Catholic Church
- St Thomas Anglican Church
- St Davids Presbyterian Church
- Kingsgrove Christian Brethren Church
- Kingsgrove Chinese Christian & Missionary Alliance Church



## What is Collaborative Planning?

Collaborative planning is key to the subcatchment planning process. Collaborative planning means partnering with all stakeholders in each aspect of decision making including the development of alternatives and the identification of the preferred solution (IAP2 2004).

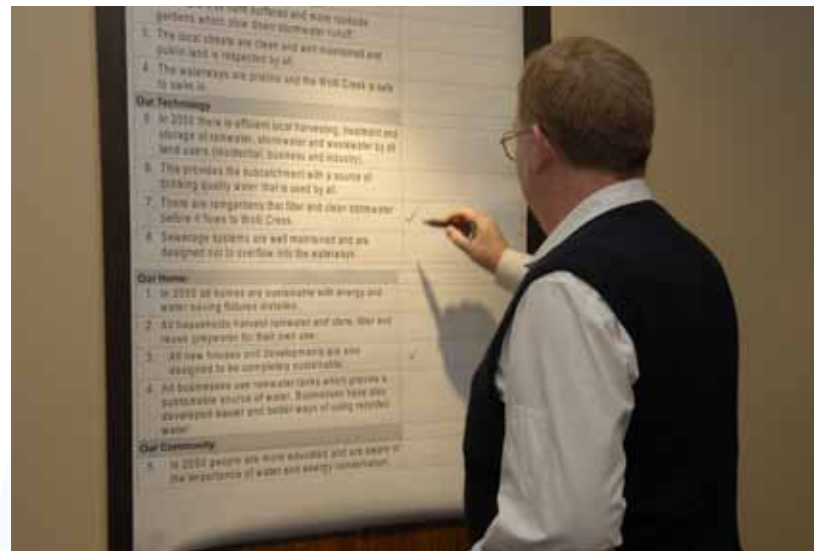
## Collaborative planning in the Upper Wolli Creek Subcatchment

The Upper Wolli Creek Subcatchment stakeholders include:

- residents
- businesses
- schools
- community groups
- government organisations

Collaboration with stakeholders has consisted of the following:

1. Survey: Residents and businesses completed a survey which included questions about knowledge, behaviour and attitudes related to water (see page 9).
2. Vision sessions: In March and April 2009 residents and other stakeholders took part in workshops to develop the Upper Wolli Creek Subcatchment 2050 community water vision (see page 2).
3. Planning forums: In April and May 2009 residents and other stakeholders including representatives from the Cooks River Urban Water Initiative (managed by the Sydney Metropolitan Catchment Management Authority), National Parks and Wildlife Service (part of Department of Environment, Climate Change & Water), Cooks River Foreshores Working Group and the Wolli Creek Preservation Society worked with the OurRiver team and Canterbury, Hurstville and Rockdale council staff to develop goals and actions to achieve the community water vision (see pages 12-15).
4. Interviews and meetings: OurRiver have discussed current water management practices at Council with staff and continue to work with staff across Council, exchanging information and ideas.



## Benefits

The vision sessions and planning forum provided the community with an opportunity to share their local knowledge, increase their awareness of water management issues specific to the local area and gain knowledge on more general concepts such as Water Sensitive Urban Design. The sessions also assisted the OurRiver team and council staff in determining the community's receptivity to water reuse and treatment techniques. Gaining this understanding is essential for creating a management plan that is appropriate for the local area and is supported by local stakeholders.

## Ongoing Collaboration

Stakeholder collaboration is important throughout the life of the Upper Wolli Creek Subcatchment Management Plan in order to understand and incorporate the changing needs of stakeholders (council staff, residents, business owners, community groups, etc.) and the environment. Ongoing engagement also helps to create a greater sense of awareness and ownership of things like on-ground works projects.

Stakeholders may continue to be involved in a number of ways including on-ground activities (such as a community planting day for a newly built raingarden), and reviewing and reprioritising goals and actions. This involvement may take the form of a subcatchment working group or may be less formal.

*Photos here are from the Upper Wolli Creek Subcatchment community planning forums held in April and May, 2009.*



## Upper Wolli Creek Subcatchment 2050 Community Water Vision, Goals and Actions

The Upper Wolli Creek Subcatchment 2050 Community Water Vision was developed by Subcatchment residents, Council staff and other stakeholders at the vision sessions, held on Wednesday 25 March and Wednesday 1 April 2009. Following the vision sessions, the 2050 Community Water Vision was divided up into statements and categorised into common themes (Our Catchment, Our Technology, Our Homes and Our Community). At the two planning forums, held on Wednesday 29 April and Tuesday 5 May 2009, the community chose which statements were most important to them and then developed goals and actions for each of these prioritised statements. The prioritised statements and their associated goals and actions are presented over the following four pages (12-15), these reflect the desires and wishes of the Upper Wolli Creek Subcatchment community who attended the vision sessions and planning forums.

### Theme 1 - Our Catchment:

*In 2050 there are less hard surfaces and more roadside gardens (raingardens) which collect stormwater and filter out the pollutants before it flows into Wolli Creek.*

#### Goals:

- Reduce or halt the Subcatchment's urban impermeable (hard surfaces) footprint.
- Build 10 Water Sensitive Urban Design (WSUD) structures within the Subcatchment.
- Retrofit existing development with WSUD where it's feasible.
- Install raingardens and other WSUD structures in wide streets.
- Maintain environmental flows for Wolli Creek.

#### Actions:

- Conduct an education campaign for both community and council staff on the effect that increasing impervious surfaces has on the waterway environment.
- Implement planning controls that help reduce or stabilise the urban impermeable surface footprint.
- When implementing WSUD structures, target the areas in the Subcatchment that are likely to benefit the most (e.g., where flooding occurs after intense rainfall).
- Council investigates and considers incentives related to hard surface area and stormwater discharge (e.g., incentive for rainwater tanks or other WSUD features that effectively reduce impermeable area by slowing, cleaning/filtering stormwater discharge).



Grassed swale, Warriewood NSW.  
Photo courtesy of [www.wsud.org](http://www.wsud.org)



## Theme 2 - Our Technology:

*In 2050 there is efficient local harvesting, treatment and storage of rainwater, stormwater and wastewater by all land users (residential, business and industry).*

### Goals:

- All residential properties and industrial sites are collecting and storing rain/stormwater.
- All commercial enterprises that consume large amounts of water are using rainwater, stormwater or recycled wastewater.
- Stormwater is treated/cleaned before it enters the natural water cycle.

### Actions:

- Council to be an active partner with residents, businesses and industry in water and energy conservation activities.
- Opportunities for sustainability measures (e.g., rain/stormwater harvesting, raingardens, green roofs, energy conservation) are continually identified and pursued by Council and all Subcatchment stakeholders.
- Identify the potential for rainwater harvesting within the Subcatchment, for commercial, industrial and residential.
- Gross pollutant traps are used, where appropriate, as an extra measure to protect waterway health.
- Install rainwater tanks and build stormwater treatment and storage devices in roads and parks where appropriate.
- Identify a model business/industry that has implemented water and energy saving devices or assist a business/industry in becoming a demonstration model.
- Identify and promote appropriate funding opportunities for water saving devices.
- Identify and promote the application and use of sustainability focused building techniques (e.g., green roofs) within Council's planning instruments and guidelines.



Raingarden, Sydney University NSW.  
Photo courtesy of [www.wsud.org](http://www.wsud.org)



Raingarden, Hill St, Marrickville NSW. Photo courtesy OurRiver.



## Theme 3 - Our Homes:

*In 2050 all homes are sustainable and use energy and water saving fixtures.*

### Goals:

- All appliances and fixtures use the best practice technology of the time.
- All homes have an on-site water-collecting device that collects or provides access to 100% of the water required for that home/property.
- All dwellings reuse greywater on-site.
- Local and regional water collection and reuse schemes for irrigating parks and for people who can't collect sufficient water on their property. Excess water is fed back into the mains supply (similar to solar energy feeding into the electricity grid).

### Actions:

- Permeable paving is used in the Subcatchment instead of bitumen and concrete where appropriate.
- Federal, State and Local Governments promote ongoing subsidies to support water and energy efficiency efforts (e.g., Every Drop Counts).
- Community water collection and storage devices are investigated (e.g., under roads and in parks).
- Incentives (e.g., subsidies, rebates and grant funding) are established to encourage the uptake of sustainable urban water management practices on private properties.
- Greywater diversion systems are encouraged and widely used.
- Make rainwater tanks, or similar storage device, a requirement for all dwellings.
- Investigate regional water reuse schemes e.g., 3-pipe system (potable, non-potable, wastewater).
- Conduct education campaigns in schools, community groups and the wider community to showcase the Subcatchment.
- Water meters are on display to publicly identify the water usage of each dwelling.



Permeable paving, Sydney Olympic Park, NSW.  
Photo courtesy of [www.wsud.org](http://www.wsud.org)



Residential rainwater storage tank, Bexley North NSW.  
Photo courtesy OurRiver.



## Theme 4 - Our Community:

*In 2050 people are better informed and aware of the importance of, and actively engaged in, water and energy conservation.*

### Goals:

- All people are actively involved in maintaining their community raingarden or local WSUD feature.
- All energy consumed locally comes from renewable, non-polluting resources.
- All roofs (residential, business and industrial) collect rainwater for reuse purposes.
- People are participating in a variety of water conservation measures.
- Wolli Creek Subcatchment is seen as a model of 'sustainability' with regards to its water management practices.
- People take responsibility for their streets and there is a genuine sense of civic pride.
- There is an embedded cultural change towards sustainability – by residents, businesses and industry alike.

### Actions:

- Actively promote WSUD through media, schools, tours, local groups, signs, festivals, street parties.
- Identify ways to fund on-going maintenance of open-space associated with business and industrial development.
- All community centres double as environmental resource centres and where possible, convert under-utilised public space into community gardens and/or nurseries.
- Actively engage the community to increase their awareness of water issues, conservation and sustainability.
- Council sponsors competitions for local areas based on recycling, water conservation, etc.
- Councils deliver sustainability focused education campaigns designed to ignite community interest, support and participation (including within culturally and linguistically diverse communities).



Cyclist on the Cooks River cycle way.  
Photo courtesy OurRiver.



Upper Wolli Creek Subcatchment community planning forum, April 2009.  
Photo courtesy OurRiver.



The Upper Wolli Creek Subcatchment community actions (pages 12-15) include actions that are related to both non-structural (e.g. policy and education) and structural (on-ground works) solutions. The actions listed below (non-structural related actions) and on page 18 (structural related actions) have been developed by Council and OurRiver staff, and draw on the goals and actions that have been identified by the Subcatchment community. The Council Actions listed below describe those activities that can be most effectively implemented or carried forward at the local council level in order to help achieve the broader aspirations of the Upper Wolli Creek community.

## Non-structural Council actions for Upper Wolli Creek Subcatchment:

Action Type	Council Actions	How It Will Be Implemented
<b>Education and Awareness</b>	Conduct ongoing education and awareness programs that promote sustainability, and the adoption of sustainable urban water management practices/behaviours within the residential, school and business communities.	Workshops and events to be implemented through the Sustainability Workshop series within Council's Waste & Sustainability Improvement Program and promoted via Council's website, libraries and child care facilities. Water conservation and environmental sustainability will also be promoted within Council's various ongoing business audit and compliance programs.
	Build knowledge and civic pride within the local community by actively promoting community participation in the location, design and maintenance of WSUD infrastructure.	Residents will continue to be consulted regarding the construction of all significant WSUD infrastructure. This will be done using a combination of specific focus/project groups and/or publicly exhibited information. The activities of various community groups will be promoted via Council's existing newsletters publications and local media.
<b>Reporting and Accountability</b>	Provide details of Council's consumption of potable water, including any activities designed to reduce that consumption, within Council's Annual Report.	Council prepares an annual State of the Environment Report outlining water consumption at its major water consuming facilities. This information will be promoted widely and made available on Council's website.
	The construction of all new Council owned WSUD infrastructure to be determined within a sustainability framework that considers environmental, social, governance and economic factors.	Council prepares an annual Environmental Management Plan where WSUD actions are outlined. Projects are assessed through a selection process which applies a sustainability framework.
<b>Staff Training</b>	Conduct targeted education and awareness programs that enhance Council's capacity to deliver sustainable urban water management outcomes within the local community.	Priority training requirements for both indoor and operational staff will be conducted during 2010-11 and as required on an on-going basis.
	Key staff to participate in relevant industry groups, associations and other forums in order to keep abreast of emerging SUWM/WSUD technologies and solutions.	The Ourriver Program has supported industry events and forums and identified and where appropriate, funded relevant training for the development of technical/professional skills within the organisation.



### Non-structural Council actions for Upper Wolli Creek Subcatchment continued:

Action Type	Council Action	How It Will Be Implemented
Funding	Key staff to identify and promote appropriate funding opportunities/mechanisms to increase the uptake of SUWM practices/behaviours within the community.	Council will continue to publicise grants, subsidies, rebates and other funding mechanisms that promote SUWM uptake within the local community (e.g. Sydney Water rainwater tank rebates). Staff will also continue to explore other avenues for funding Council projects including grants and levies (e.g. Stormwater Management Service Charge).
	Priority on-ground works to be identified and considered in Council's annual business and financial planning processes.	Structural actions identified in this plan will be considered in the preparation of Council's annual budget, Management Plan, and Capital Works Schedule. Where appropriate partial funding may be allocated to support external funding applications.
	Ensure all Council owned WSUD infrastructure is identified within the organisation's Asset Management Plan (AMP).	All new WSUD infrastructure will be included in Councils AMP to ensure appropriate levels of funding are allocated to support the effective functioning of the asset in the medium to long term.
Planning Controls	Appropriate controls are included within Council's Planning instruments, policies and guidelines to encourage the adoption of innovative, yet proven WSUD/SUWM technologies and practices within the LGA.	Council will be preparing a comprehensive Local Environmental Plan (LEP) for the City. It will be supported by a range of documents including Development Control Plans (DCP) and Development Contributions Plans. The preparation of these documents will be underpinned by a concerted focus to deliver sustainable environmental outcomes, including the protection and conservation of water resources, where appropriate and practicable.

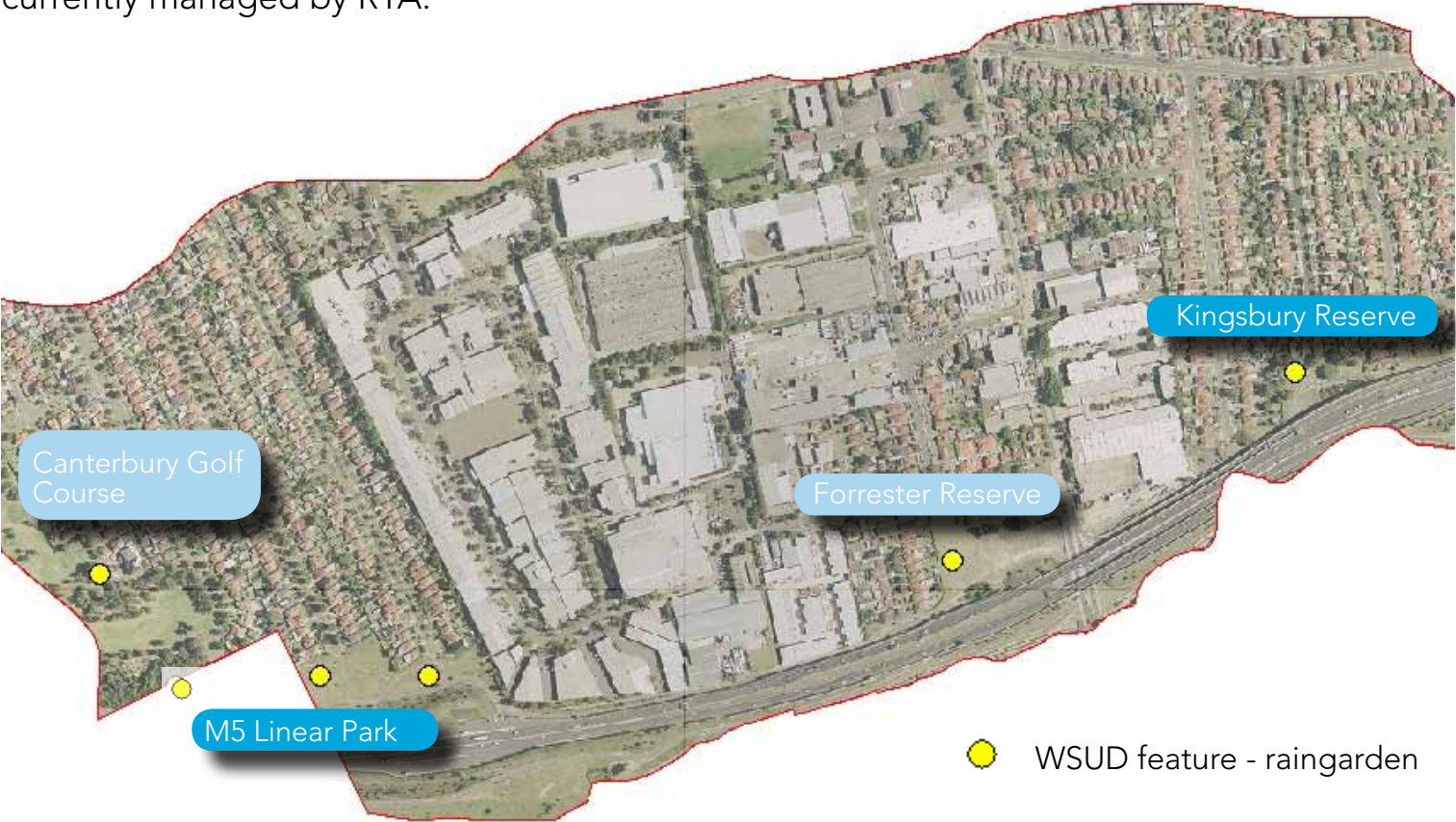


Photos from left to right: 1) Subcatchment planning forum, 2) Upper Wolli Creek Water Wise Tour, 2009 3) Rainwater harvesting/reuse scheme, 4) Subcatchment planning forum . All photos courtesy OurRiver.



## Structural Council actions for Upper Wolli Creek Subcatchment

Several sites have been identified in the Canterbury Council section of the Upper Wolli Creek Subcatchment as being potentially feasible for building Water Sensitive Urban Design (WSUD) features. Initial investigations of the sites have indicated that they may be suitable for stormwater treatment devices such as raingardens. The map below shows the locations of the possible sites for raingardens which includes both council land and land currently managed by RTA.



Canterbury Council's section of the Upper Wolli Creek Subcatchment showing the location of sites that are potentially feasible for raingardens, these have been identified through the OurRiver project.

Location of Raingardens	Size of Raingarden Catchment (hectares)	Land owner
Canterbury Golf Course	1.4 - 2.7	Canterbury Council (privately managed)
M5 Linear Park - raingarden 1	1.7	Roads & Traffic Authority
M5 Linear Park - raingarden 2	8.9	Roads & Traffic Authority
M5 Linear Park - raingarden 3	3.0	Roads & Traffic Authority
Forrester Reserve	2.4	Canterbury Council
Kingsbury Reserve	8.0	Canterbury Council

The potential sites/structural actions identified here do not represent the definitive list of potential actions for the Subcatchment. Further investigation will reveal other opportunities to implement WSUD technologies to help reduce the amount of pollutants that leave the Subcatchment, as well as reduce the growing demand on the drinking water supply. These could include:

- use of permeable paving instead of bitumen and concrete where appropriate
- rain/stormwater harvesting/reuse at residential and industrial properties
- retrofitting existing buildings with WSUD features/fittings where appropriate
- streetscape raingardens and other WSUD features are built where appropriate

The implementation of any options will be dependant on funding availability and the WSUD designs being:

- deemed feasible and cost effective
- determined to provide the maximum environmental benefit
- going to enhance the natural beauty and amenity of the local environment

### What is a Raingarden?

A raingarden is a special type of garden that has been designed to receive stormwater flows. It is built with specialised layers of soils and plants that act as a filter to remove pollutants from water. Depending on the type of raingarden, the filtered water then either drains back into the stormwater system and into the nearest waterway, or soaks into the surrounding soil.



### M5 Motorway Linear Park

The large, relatively flat open spaces of the road reserve adjacent to the M5 Motorway provides some of the most ideal areas for WSUD features in this section of the Subcatchment. A partnership between Council and RTA is therefore recommended to ensure both the potential for WSUD is further investigated and that the best water management outcomes can be achieved.



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3. CRVA - Cooks River Valley Association, home page viewed online 1 December 2009, <<http://www.crva.org.au/>>
4. IAP2, International Association for Public Participation, *IAP2 Public Participation Spectrum 2004*, <<http://www.iap2.org.au/resources>>
5. Landcom, *Water Sensitive Urban Design: Book 2, Planning and Management*. Parramatta, NSW : Landcom, 2009.
6. WCPS - Wolli Creek Preservation Society, home page viewed online 1 December 2009, <<http://www.wollicreek.org.au/>>
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8. Wong, Tony, 2007, *Water Sensitive Urban Design - the Journey Thus Far*, BEDP Environment Design Guide, August 2007, Des 11, Summary, The Royal Australian Institute of Architects.



Street-side raingarden retrofit, Kingston VIC.  
Photo courtesy [www.wsud.org](http://www.wsud.org)



Raingarden at St Vincent's Hospital, Darlinghurst NSW.  
Photo courtesy OurRiver.



Raingarden median strip, Victoria Park, Zetland NSW.  
Photo courtesy OurRiver.