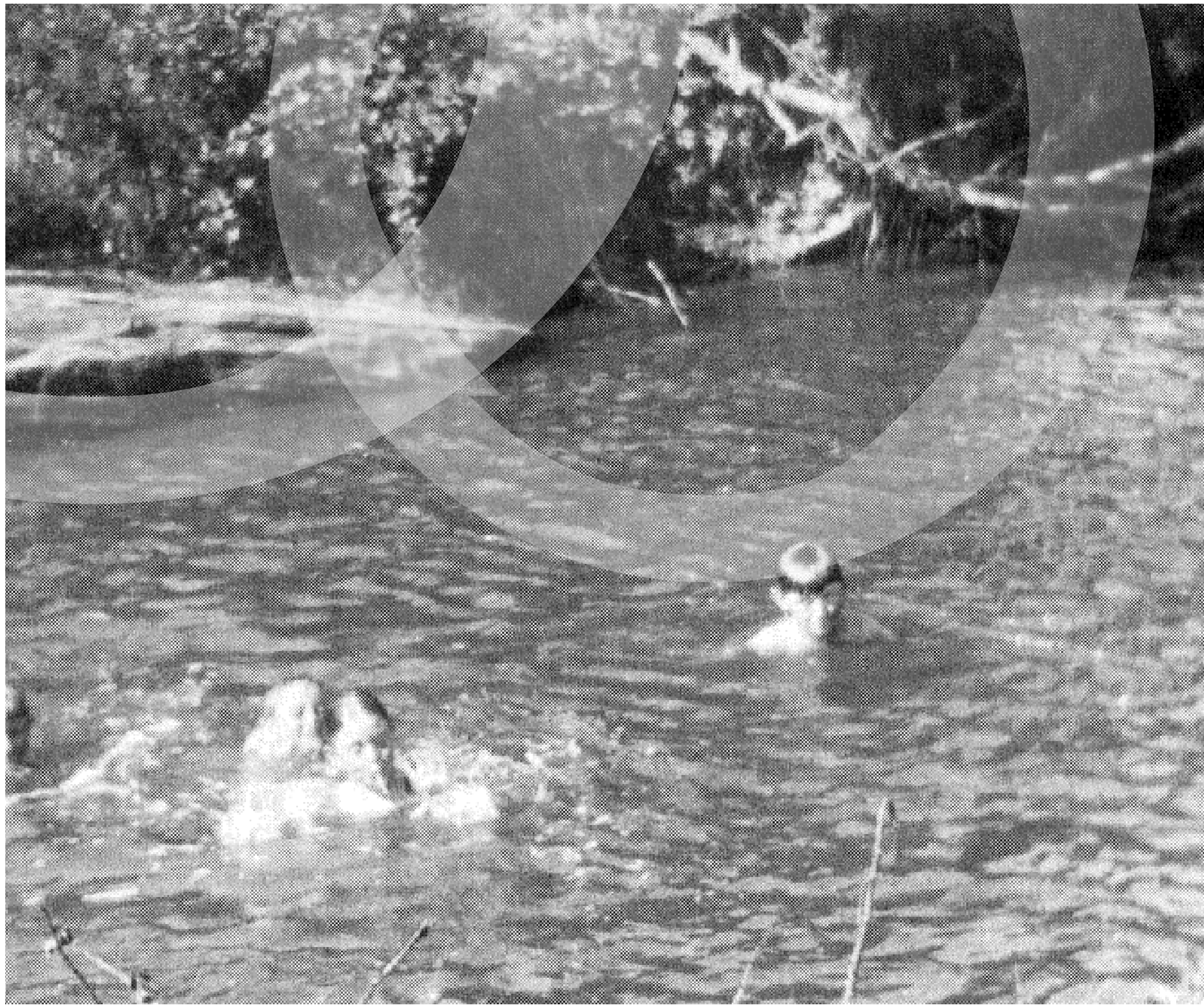
Cooks River Sustainability Initiative

Planning Upper Wolli Creek Subcatchment



Cooks River Foreshores Working Group

NSW Environmental Trust

Rockdale City Council On Historic Botany Bay

City of Canterbury City of Cultural Diversity

Hurstville City Council

OurRiver

cooks river sustainability initiative

Contents

Front Cover: From top left corner: 1) Wolli Creek Reflections by Barry Porter, 2008; 2) The Berry Family, near Miller and Homer Streets, 1940s (Mr Berry); 3) Swimming in Wolli Creek at Flat Rock, near the present-day Bexley North Station, 1920s (Mrs M Woods); 4) Staples Street looking towards the corner of Wolli and Edwards Streets, date unknown (Mrs M Woods).

Introduction - The Cooks River Sustainability Initiative

OurRiver
cooks river sustainability initiative

The Cooks River Sustainability Initiative (CRSI) is about communities, businesses and councils working together in a new way for long term improvement of the Cooks River catchment.

Partnership

The CRSI is a partnership between eight councils within the Cooks River catchment: Ashfield, Bankstown City, City of Canterbury, City of Sydney, Hurstville City, Marrickville, Rockdale City and Strathfield Councils.

The goals of the Initiative are to:

- Improve the quality of water that flows to the Cooks River;
- Create new relationships within and between councils and the community that will provide ongoing long term benefits for the Cooks River; and
- Develop a Vision and Action Plan for six local subcatchments.

The Cooks River catchment (area outlined in black) is approximately 10,200 hectares. and is made up of many smaller subcatchments.

The CRSI is currently working on six subcatchments, named Ashbury, EC East, Munni Street, Rookwood Road, Strathfield South and Upper Wolli Creek.

Why is this Initiative unique?

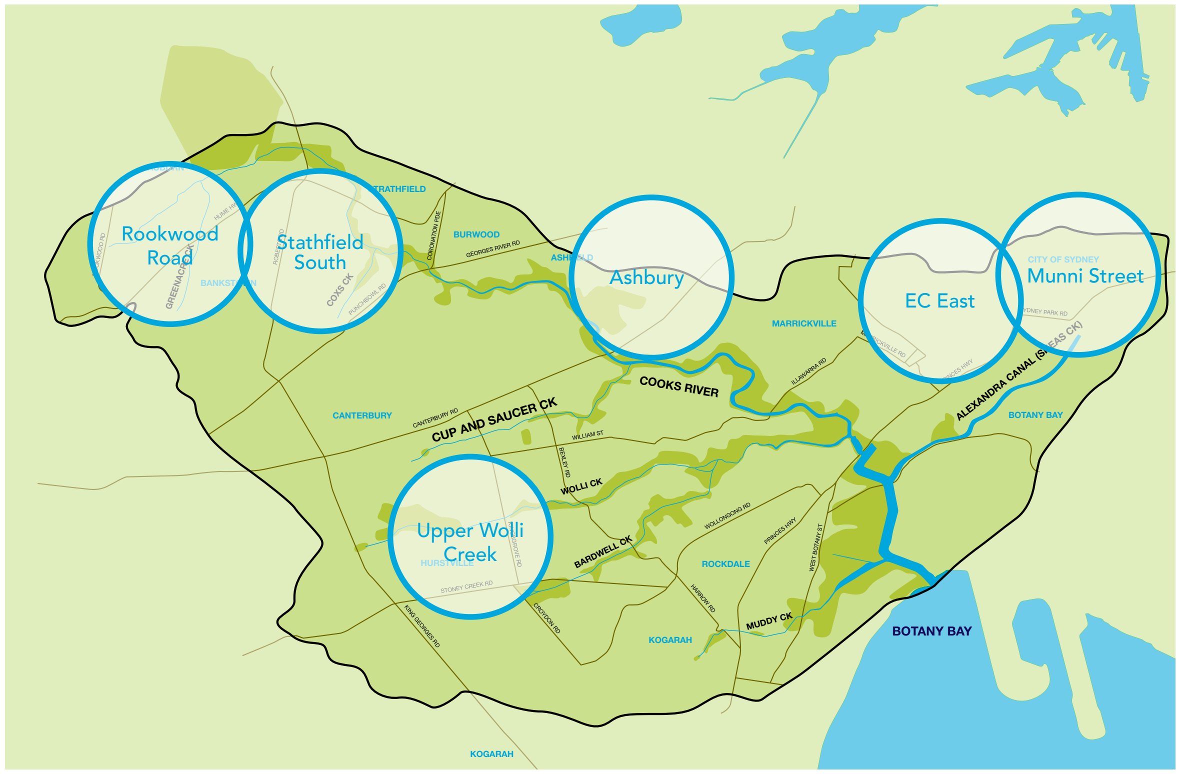
The CRSI acknowledges and builds on previous work and studies completed by other government agencies, local councils and community groups. CRSI is however, taking a new approach to improving the long term health of the Cooks River. This new approach includes:

- Planning at a neighbourhood or subcatchment scale, working in partnership with local people to ensure solutions represent local ideas, knowledge and values; and
- Undertaking detailed social, physical and organisational research to ensure solutions and strategies developed are right for the subcatchment and its community.

How is this Initiative being funded?

The Initiative is funded from 2007 to 2010 through the NSW Environmental Trust's Urban Sustainability Program.

Photo by Tanja Pokrajac



CRSI Subcatchments

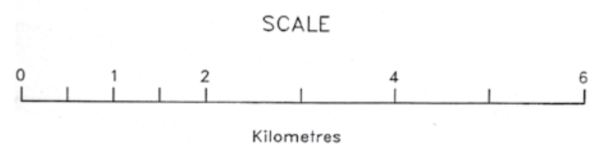
OurRiver
cooks river sustainability initiative

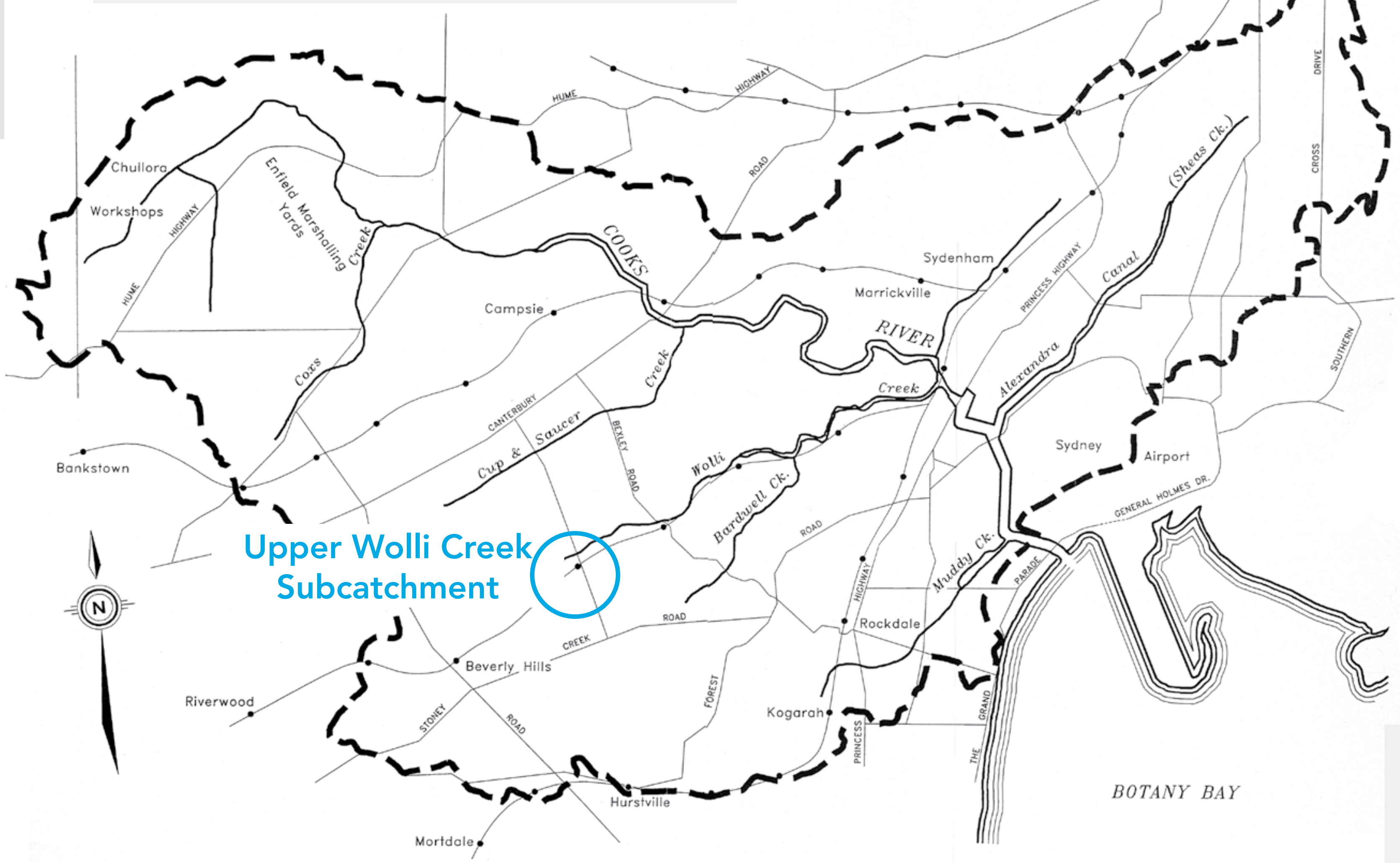
Cooks River Catchment

The Cooks River Catchment is located in the southern suburbs of Sydney and covers an area of approximately 10,200 hectares. The Cooks River originates in Bankstown and flows 23 kilometres east to discharge into Botany Bay.

There are 8 tributaries to Cooks River:

- Wolli Creek
- Bardwell Creek
- Muddy Creek
- Sheas Creek / Alexandra Canal
- Cup and Saucer Creek
- Coxs Creek
- Fresh Water Creek





Water Quality

Cooks River is regarded as one of the most polluted urban rivers in Australia. Discharges of sediments and gross pollutants combined with sewage overflows are significant contributors to the degradation of the river.

Various studies since 1997 have identified that the river contains high levels of faecal contaminants, elevated concentrations of heavy metals (lead, zinc, mercury, chromium, silver and copper), high levels of nutrients resulting in potential for eutrophication or algal growth and highly contaminated sediments.

Poor water quality means that recreational activities which involve close contact with the water such as swimming, are not recommneded in the Cooks River.

Impacts on Estuarine Environments

There are over 150 sewer overflow points that regularly discharge sewage into the Cooks River after rainfall events. Stormwater runoff and sewer overflows have a negative impact on the River. Toxins in sewage and stormwater accumulate in the river bed and affect organisms that live in the mud and the animals that eat them. Sediments in stormwater smother water plants and destroy the habitat of riverine animals.

Before European Settlement

Prior to the arrival of the First Fleet in 1788, it is estimated that 1500 Aborigines lived in the Port Jackson/Botany Bay area. The Cadigal and Wangal people had successfully lived along the Cooks River for thousands of years. Over this time, an enormous body of knowledge and special skills were developed to use the life sustaining resources that the Cooks River and the surrounding lands provided.

The Cadigal people spoke the coastal Eora language and are often referred to as the Eora people. Other clans of the Sydney region who occupied different parts of Eora land included the Wangal, the Cammeraygal, the Cadigal and the Bidjigal.

There were two major groups to the north and south of the Eora lands; they were the D'harawal and Darug.

Cadigal history, like the history of many Aboriginal clans, is based on oral traditions handed down by many generations over millennia. However, through the invasion, the Cadigal and Wangal nations were dispersed, dispossessed and alienated from their traditional lands.

This information is taken directly from the Cadigal-Wangal website 2008 http://www.marrickville.nsw.gov.au/cadigalwangal/main.htm

Urban Water Management

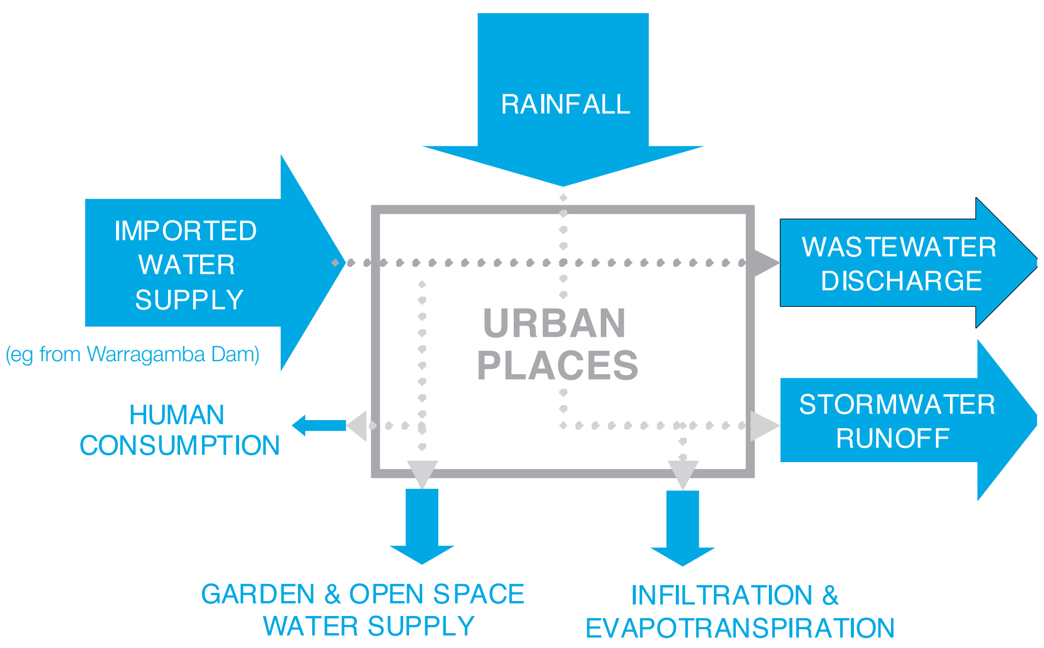
The Cooks River Sustainability Initiative is funded by the NSW Environmental Trust's Urban Sustainability Grants Program. It aims to plan for managing water sustainably in urban environments such as the Upper Wolli Creek Subcatchment. The project addresses three problems in conventional urban water management:

1. Technical experts have traditionally been responsible for developing solutions to complex urban water problems. Other thinkers are also needed to gain a broader understanding of issues around urban water managerment, such as social scientists and ecologists.
2. The people affected by urban water problems, including residents, businesses, community groups and government departments need to work more closely to identify solutions.
3. Plans are usually designed for whole river catchments and can miss out on practical 'locally grown' solutions to urban water problems.

Sustainable urban water management means:

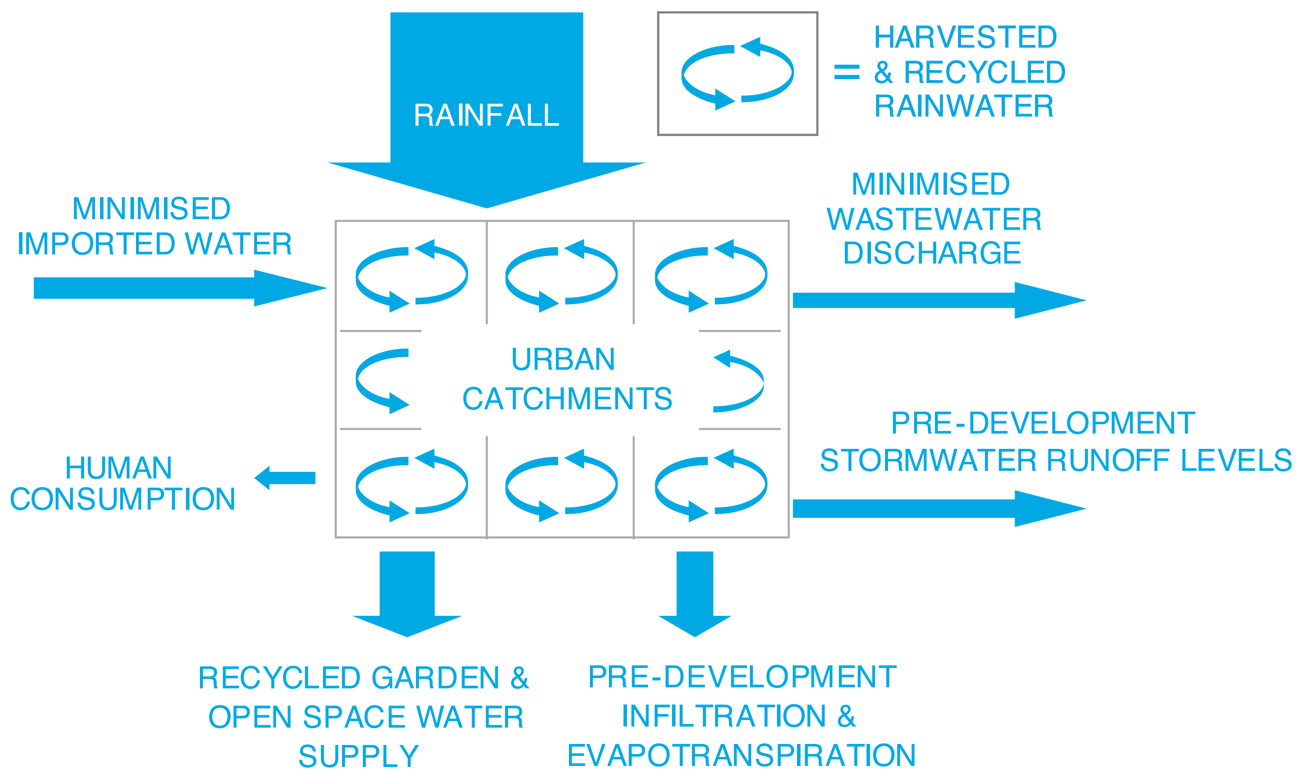
- Reducing the amount of wastewater leaving a catchment that may cause pollution in other areas (eg ocean outfalls);
- Reducing the reliance on drinking quality (potable) water brought in from outside the catchment;
- Using water appropriately ie using potable water for consumption only – not for watering the garden or flushing the toilet, and
- Reducing the impact of stormwater on waterways.

Conventional Urban Water Management



Traditionally, the main goal is flood protection

Sustainable Urban Water Management



Stormwater and wastewater are valued as a resource

Three Councils Working Together:

The Upper Wolli Creek Subcatchment lies across the boundaries of three local government areas - City of Canterbury, Hurstville City and Rockdale City. These three Councils are working cooperatively to share their resources, knowledge and skills and to work collaboratively planning for the Upper Wolli Creek Subcatchment.

What have we done so far?

- Collected and reviewed data on the demographics in the Upper Wolli Creek Subcatchment;
- Surveyed residents about their attitudes, knowledge and current behavior in relation to water conservation and use;
- Collected and analysed information about the physical environment in the Subcatchment;
- Calculated the water budget for the Subcatchment – this is the amount of water coming in and out of the area (see page 6);
- Involved people from many disciplines in identifying problems and solutions – engineers, social planners, environmental scientists, educators, parks and recreation managers; and
- Identified possible on-ground water solutions.

What is happening with water now?

In 2009:

- 99% of drinking quality water is used for purposes other than drinking and 88% of drinking quality water ends up in the ocean as wastewater;
- 65% of rainwater runs directly into Wolli Creek (via stormwater drain networks) and then into the Cooks River. This happens because 67% of Upper Wolli Creek Subcatchment is impervious (sealed surfaces that do not allow water to soak into the soil);
- Rainwater runoff from the roofs and streets of Upper Wolli Creek Subcatchment carries sediments and other pollution to the Creek;
- The level of pollution in the Cooks River is so high that it cannot be used for swimming or fishing 75%-100% of the time; and
- Sydney's dam storage water supply cannot be guaranteed in the long term.

What are we doing now?

Residents and other stakeholders are being asked to imagine what water management will look like in Upper Wolli Creek Subcatchment in 2050. The results will contribute to a community water vision which will be the basis for planning at community forums to be held in April and May 2009.

Why a community water vision?

In the past the people living and working in the areas affected by water plans have not always been included in the planning process. Therefore plans have not always been appropriate, supported and/or fully understood by the main water users and decision-makers.

Inclusion of the community water vision in the planning for Upper Wolli Creek Subcatchment will make use of local knowledge and represent locally generated ideas. This will produce a plan that is tailor-made to local conditions and therefore be more widely accepted and adopted.

How to use this booklet

This booklet presents information about the Upper Wolli Creek Subcatchment relevant to water planning. To help you take part in the vision and planning sessions, think ahead to the year 2050 and as you read this booklet imagine how things may have changed by then. Please make notes of your ideas in this booklet. Some specific questions you might like to think about are included on relevant pages throughout the booklet. These and any other questions you have can be discussed during the vision session.

The Wolli Creek Valley

Newly planted natives, near Turella Station – Peter Stevens

Wolli Creek is the largest of the four major tributaries of the Cooks River. Rising in Narwee and Roselands, the creek runs through the Wolli Creek Valley in a north easterly direction joining the Cooks River near Tempe. This Valley contains one of the largest and most significant areas of bushland in inner southwest Sydney. It not only provides important habitat for many fauna and flora 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 birdlife, wetlands, park areas and 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). Additonal land is in the process of being acquired by NPWS that will see the Regional Park increase in size to 50 hectares.

The Wolli Creek bushland is still under threat from increasing urban development, dumped rubbish, stormwater pollution, weed invasion and feral animals such as foxes, cats and dogs. A lot of bush restoration work however, is being undertaken by community volunteers from the Wolli Creek Preservation Society (WCPS) with support from City of Canterbury, the Department of Environment and Climate Change, the NSW Environmental Trust, the Department of Planning, the Sydney Metropolitan Catchment Management Authority (CMA), and corporate volunteers (Westpac, PricewaterhouseCoopers and others) through Landcare Australia.

Some of the many works along the Wolli Creek include:

- **Cooks River Urban Water Initiative** - a $2 million Commonwealth Government funded project that will include improving water quality in Wolli Creek. A major part of the Initiative's funding will be used to reduce the impacts of stormwater runoff on the Creek around the Regional Park area through the installation of stormwater treatment systems, these devices will reduce litter, weeds, sediment and improve the water quality. This will include the construction of pollutant traps and raingardens (bio-retention systems) which filter stormwater flowing into the Creek. The Initiative is managed by the Sydney Metropolitan CMA. For more information please visit www.cooksriver.info;
- **Missing Link Project –** a project coordinated by WCPS and supported by the Commonwealth Government, a number of State Departments, and City of Canterbury to address a gap in the vegetation corridor along the Wolli Creek around Turrella Reserve (completed in 2008); and
- **Turrella Fishway -** constructed to enable Gudgeon, Galaxius, Bream and Mullet to pass through the weir at Turrella. This project was initiated by City of Canterbury and Rockdale City Councils and jointly funded by the Department of Planning through the Cooks River Foreshore Improvement Program, Sydney Metropolitan Catchment Management Authority and the Department of Primary Industries (completed March 2009).

There are numerous ongoing bush and wetland restoration works carried out by WCPS volunteers including weed and rubbish removal and planting in key areas along the Creek.

Wolli Creek Valley Track – Deb Little

Two Valley Trail

This 13km walk from Campsie to Bexley North covers both the Cooks River and Wolli Creek Valleys. The Trail was officially launched on 1 June 2008 and there are guided walks along various sections of the Trail. For more information on the Trail or to download a copy of the Trail map please visit www.tvt.org.au

For more information on the Wolli Creek Preservation Society and how you can join please visit www.wollicreek.org.au or call 9554 3176.

Wolli Creek Fish Weir at Turrella – Deb Little

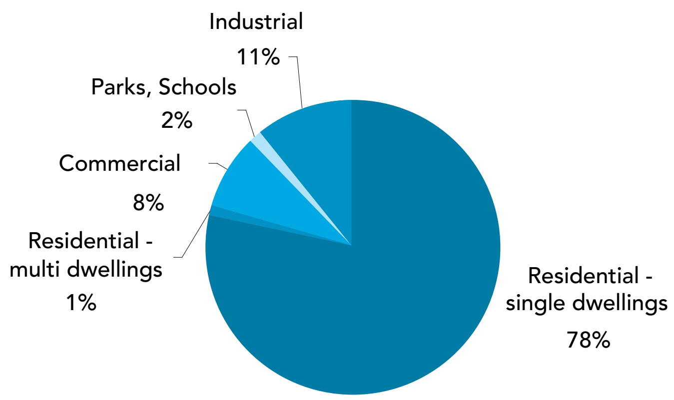
Upper Wolli Creek Subcatchment Water Cycle - Now

OurRiver
cooks river sustainability initiative

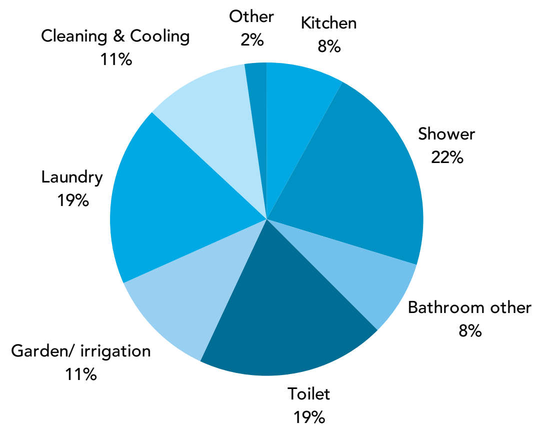
This presents an overview of the water cycle in the Upper Wolli Creek Subcatchment based on Sydney Water and Bureau of Meteorology data and the outcomes of stormwater modelling.

This water cycle highlights where potable (drinking quality) water savings can be made by harvesting and using rainwater and stormwater instead. Stormwater harvesting also provides an opportunity to treat stormwater and reduce pollutant loads.

Do you think the current water cycle is sustainable?



Consumption by landuse

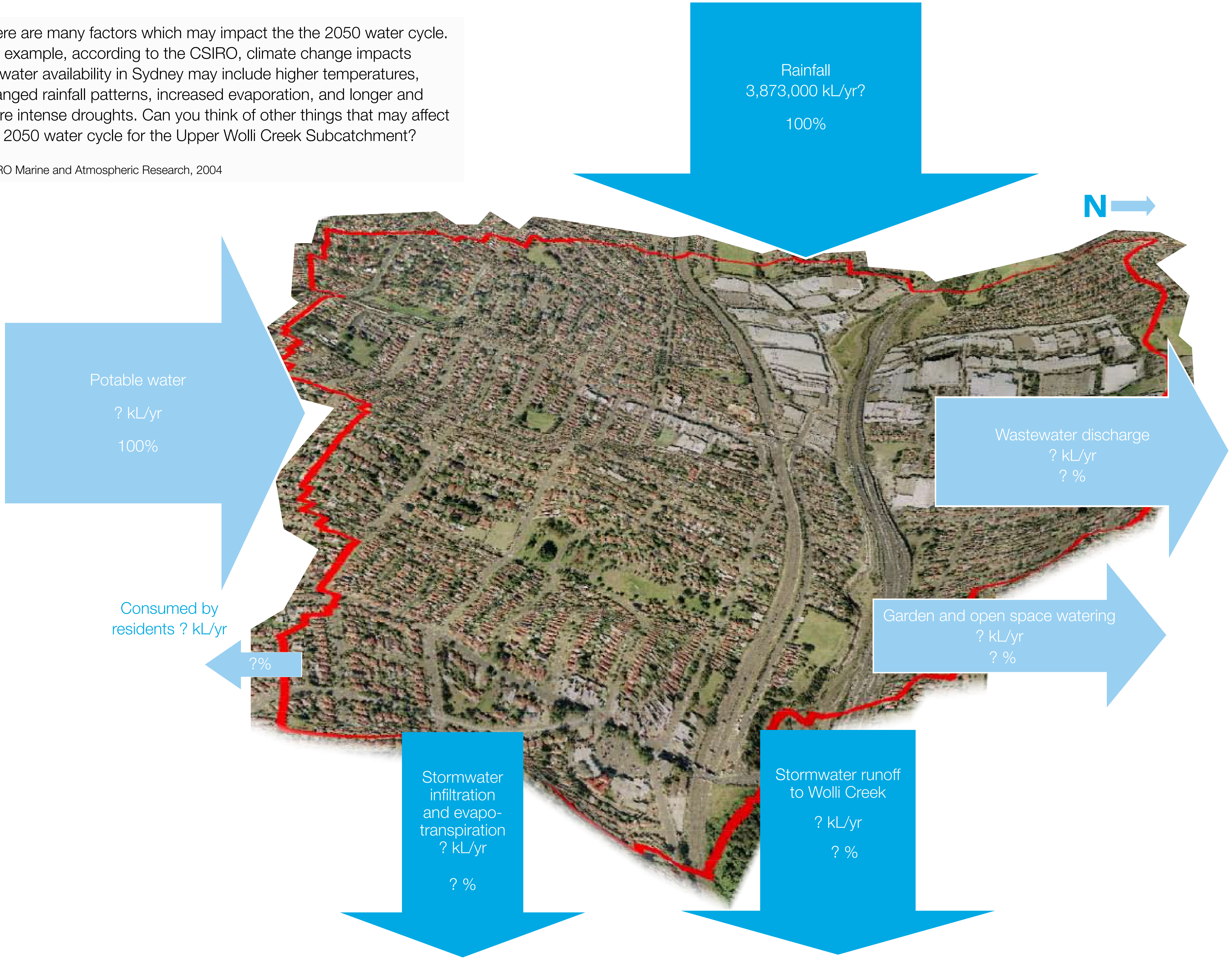


End use consumption

Upper Wolli Creek Subcatchment Water Cycle – 2050?

There are many factors which may impact the the 2050 water cycle. For example, according to the CSIRO, climate change impacts on water availability in Sydney may include higher temperatures, changed rainfall patterns, increased evaporation, and longer and more intense droughts. Can you think of other things that may affect the 2050 water cycle for the Upper Wolli Creek Subcatchment?

CSIRO Marine and Atmospheric Research, 2004



How do you think the water cycle should look like in 2050?

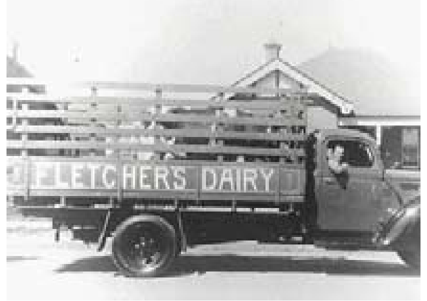
Upper Wolli Creek Subcatchment history since European settlement

Year	What Happened
To 1788:	Darug people have successfully lived in the area for thousands of years.
1804:	Governor Philip Gidley King grants Mrs Hannah Laycock 500 acres of land in the district of Bulanaming which she names “King’s Grove Farm”, this will later become the eastern half of today’s Kingsgrove.
Early 1800s:	The district surrounding King’s Grove Farm is described as a fine forest of tall trees and Wolli Creek as a small creek that feeds a chain of freshwater ponds.
1834:	The name “Wolli” first appears in written form. There is a variation in spelling across different documents, “Wollar”, “Woolli” and “Wolla”. The word is thought to mean “a blacks’ camp”.
1862:	Moorfields Chapel hosts Kingsgrove’s first public school, average attendance is approximately 30 students.
1877:	The main industry of Kingsgrove is wood cutting and wood carting, quality timbers come from the area.
1879:	Canterbury becomes a municipality of just over 1000 people. This boundary includes the northern half of Kingsgrove above Wolli Creek.
1880:	A newspaper article states that the ratepayers do not want the expense of having water piped into their homes as they have their own tanks and wells or can always collect water from Cooks River free of charge.
1887:	The municipal district of Hurstville is proclaimed, its population is 1050. Its original boundaries include the half of Kingsgrove south of Wolli Creek.
1900:	Hurstville’s Bexley Ward (the most populated part of the Municipality) separates and becomes an independent local government area.
1902:	The collectors’ books for the 1902 Census for the Kingsgrove area only mention seven streets – these include Stoney Creek Road, Croydon Road, Sharp, William and Homer Streets.
1910:	Fred Mashman purchases six acres of virgin bushland next to Wolli Creek and sets up business for himself as a maker of earthenware drainage pipes and eventually terracotta flower pots, ventilators and chimney pots.
1918-1940:	Kingsgrove is a place for small family farms. Various orchards and market gardens produce commercial quantities of fruit and vegetables, and many families still have enough land to grow their own fruit trees. Good crops of potatoes, strawberries, corn, oranges, lemons, apples, pears, peaches, plums, cumquats, and guavas grow on land around the suburb. There are also piggeries, poultry farms and dairies.
1920s:	Electricity reaches the suburb, but gas lamps are still common.
1930s:	The pools at Flat Rock in Wolli Creek (near present-day Bexley North Station) are popular swimming holes with the local children.
1931:	The East Hills railway services commence between Tempe and Kingsgrove. Kingsgrove experiences its greatest period of growth.
1940s:	The upper reaches of Wolli Creek are transformed into a concrete channel.
Late 1940s:	The population of the whole East Hills line begins to boom after the Second World War with the railway providing much of the attraction for homebuilders with the convenience of easy travel to work, school and recreation for thousands of people daily.
1949:	The Bexley Municipality is absorbed into the Rockdale Municipality.
1987:	The Wolli Creek Preservation Society becomes incorporated and remains at the forefront of the increasing opposition to the proposed expressway, which threatens to destroy the Wolli Creek Valley.
1998:	The Wolli Creek Valley is preserved and Australia’s longest (4.5km) road tunnel is constructed.
2001:	The M5 East Motorway officially opens.

All historical information has been compiled from Kingsgrove The First Two Hundred Years by Ron Hill & Brian Madden.

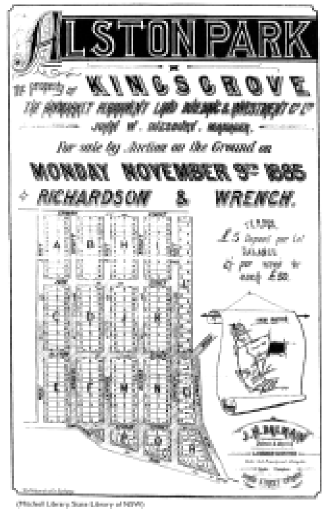
1943 aerial photo of Upper Wolli Creek Subcatchment (Department of Lands, 1943 Sydney suburbs).

Wesleyan Church 100 Moorefields Road, before 1900.
Canterbury Local History Photograph Collection



Fletchers Dairy Truck, Kingsgrove, 1950s.
Canterbury Local History Photograph Collection

Smithson’s paddock about 1910 (now part of Bexley Golf Course).
Rockdale City Library



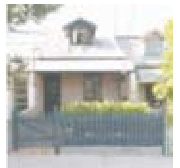
Early Kingsgrove subdivision map, 1885.
Mitchel Library, State Library of NSW

Land Use

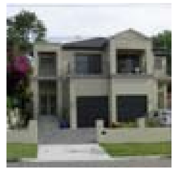
Subcatchment size: 385 Ha
No. of residential dwellings: *3,532

Residential Dwelling Types

90%
Separate Houses



3%
1 storey semi, row, terrace or townhouse



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

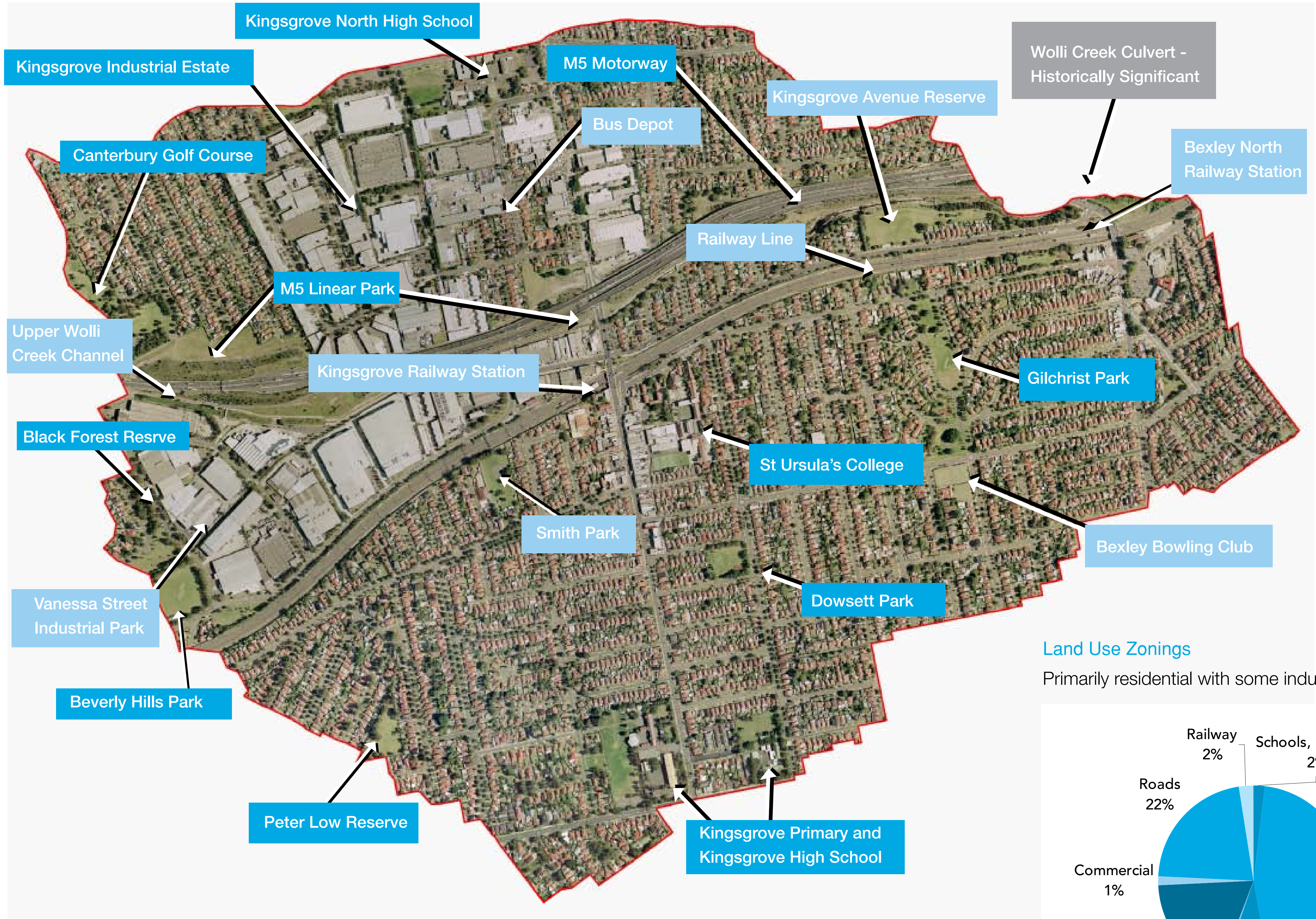
1%
House or flat attached to shop

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

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

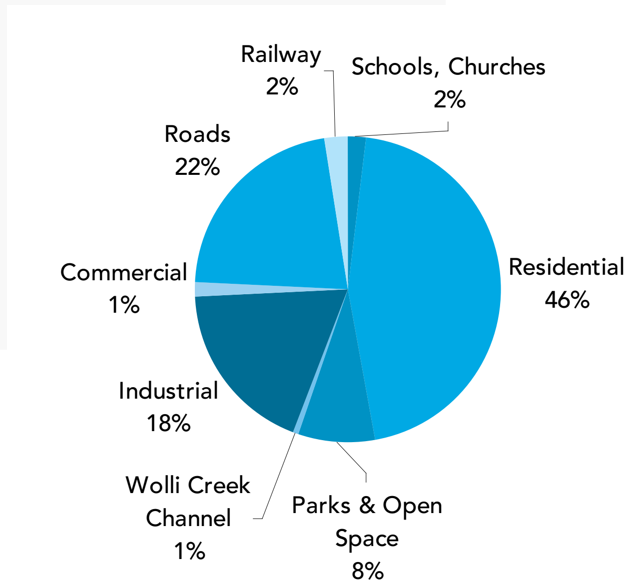
* ABS 2006 Census Data

This data was collated prior to the finalisation of the Upper Wolli Creek Subcatchment boundary. The figures for the current Upper Wolli Creek Subcatchment may therefore vary slightly from those shown on this page.



Land Use Zonings

Primarily residential with some industrial areas.



OurRiver
cooks river sustainability initiative

Authorities

Sydney Water Corporation

Sydney Water owns and is responsible for the maintenance of the concrete channel that delivers stormwater to the Wolli Creek Valley. Sydney Water is also responsible for infrastructure associated with the delivery of drinking quality (potable) water and sewage within Upper Wolli Creek Subcatchment.

City of Canterbury

The northern section of the Subcatchment above and including the M5 Motorway, falls within the City of Canterbury Council boundary.

Hurstville City Council

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

Rockdale City Council

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

All three Councils manage their respective roads and parks, including playgrounds, bushland areas and open space. Councils are also responsible for implementing planning controls and services such as waste collection.

They are required under the Local Government Act 1993 to consider Environmentally Sustainable Development (ESD) in their policies and are responsible for developing and implementing ESD programs for and with their communities.

Department of Housing/Community Housing

These organisations provide affordable housing options. Around 8% of the dwellings in the subcatchment are either rented or owned by the Department of Housing or community housing organisations.

RailCorp

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

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). RTA also manages and maintains the arterial roads within the subcatchment, such as Kingsgrove, Bexley and Stoney Creek Roads.

Land Users

Schools

Arkana Primary School, Stoney Creek Rd, Kingsgrove

Kingsgrove North High School, Kingsgrove Rd, Kingsgrove

Kingsgrove Public School, Stoney Creek Rd, Kingsgrove

Kingsgrove High School, Kingsgrove Rd, Kingsgrove

St Ursulas College, Carolyn St, Kingsrove

Our Lady of Fatima Primary School, Carolyn St, Kingsgrove

Churches

St Thomas, Morgan St, Kingsgrove

Uniting Church, cnr Kingsgrove Rd and Moreton Ave, Kingsgrove

O.L.F. Parish Centre, 89 Shaw St, Kingsgrove

Commercial Land Users

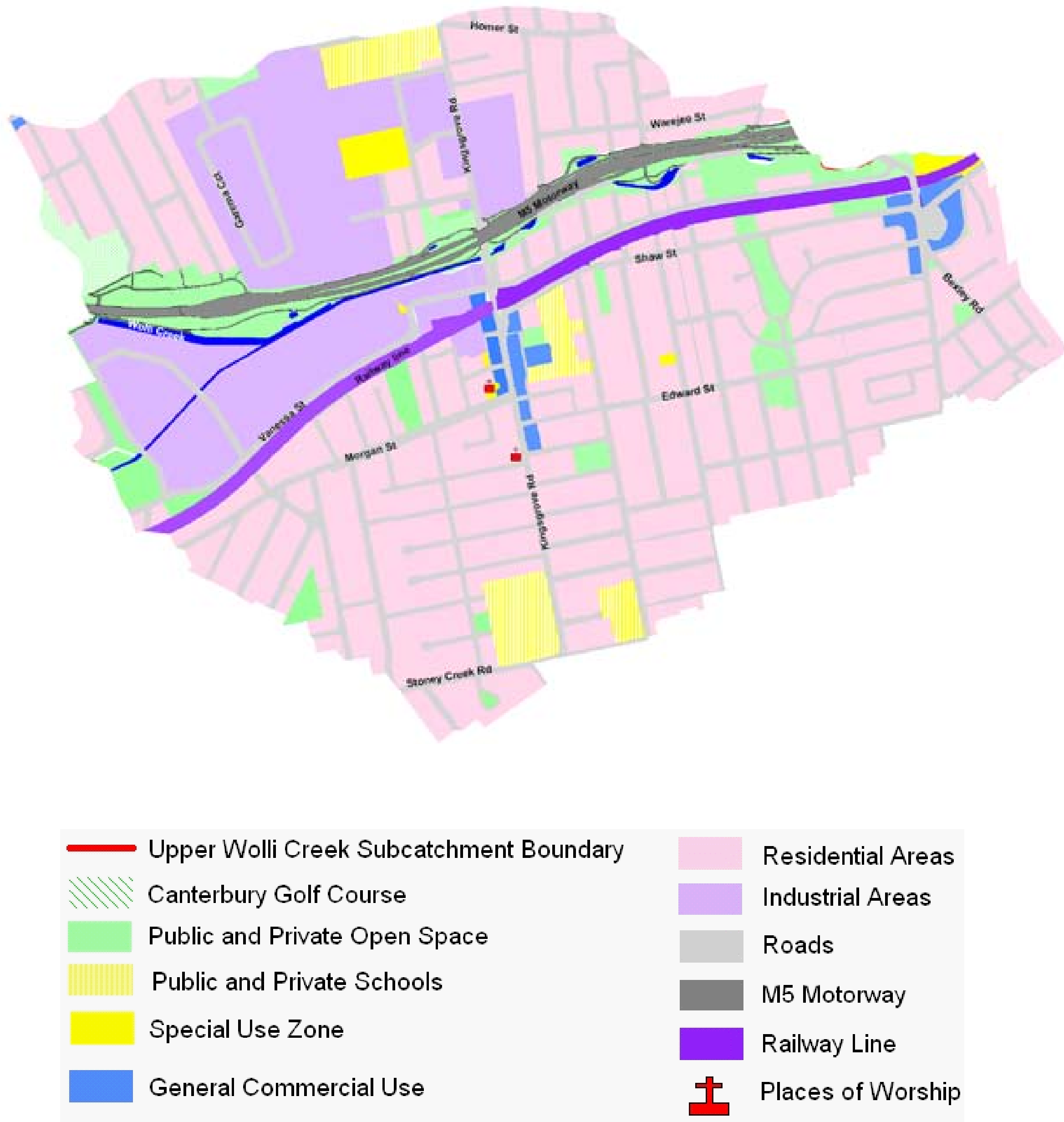
Kingsgrove Shopping Area

Bexley North Shopping Area

Industrial Land Users

Vanessa Street Industrial Area

Kingsgrove Industrial Area



Parks and Open Space Areas

There are 19 parks, reserves and other areas of open space in the Upper Wolli Creek subcatchment including Bexley Bowling and Recreation Club and Canterbury Golf Course. These areas range in size from 400 square metres to over six hectares and provide the community with access to green open space for playing, relaxing and sporting activities. Most of these areas are managed and maintained by City of Canterbury, Hurstville City and Rockdale City Councils.

Rainwater and stormwater harvesting in parks and open spaces is just one aspect of sustainable water management being investigated as part of the Cooks River Sustainability Initiative which could provide an alternative source of water for irrigation.

Whitbread Park


Canterbury Golf Course


Bexley Bowling and Recreation Club


Peter Low Reserve

Parks, Playgrounds and Open Space areas	
Amber Gardens (R)	0.04ha - Near Bexley North shopping area
Bexley Bowling Club (R)	0.72ha - Three bowling greens and club
M5 Linear Park (M)	Approx. 6.5ha - This is an M5 RTA reserve and is not managed by Council. It is located next to the Canterbury Golf Course and includes cycle and walkways adjacent to the M5
Beverly Hills Park (H)	5.30ha (1.79ha within subcatchment) - Includes a sporting field
Black Forest Reserve (H)	0.30ha (within subcatchment) - Linked to Beverly Hills Park. Has play equipment.
Butler Reserve (R)	0.23ha - Next to Kingsgrove Primary School. Has play equipment.
Canterbury Golf Course (C)	Approx. 18ha (2.94ha within the subcatchment) - Includes a stormwater fed dam outside subcatchment boundary which is used for irrigation
Clemton Park (C)	6.67ha (0.67ha within subcatchment) - Section within subcatchment boundary includes play equipment
Dowsett Park (R)	0.72ha - Rest area and play equipment
Forrester Park (C)	0.63ha - Play equipment
Gilchrist Park (R)	2.91ha - Play equipment, toilets, rest area, soccer field, tennis wall and cricket pitch and practice nets
Kingsbury Reserve (C)	0.45ha - Open space
Kingsgrove Avenue Reserve (R)	5.0ha - Change rooms, toilets, canteen, rest area and 2 soccer fields
Kookaburra Reserve (R)	0.43ha - Rest area and play equipment
Peter Low Reserve (H)	0.93ha - Play equipment and rest area
Shaw Street Reserve (R)	0.64ha - Play equipment
Smith Park (H)	1.23ha - Play equipment, cricket pitch, two netball courts, rest area and toilets
Vanessa Street Reserve (H)	0.44ha - Adjacent to the Vanessa Street industrial estate
Whitbread Park (R)	0.26ha - Play equipment

City of Canterbury (C) Hurstville City (H) Rockdale City (R) M5 Consortium (M)

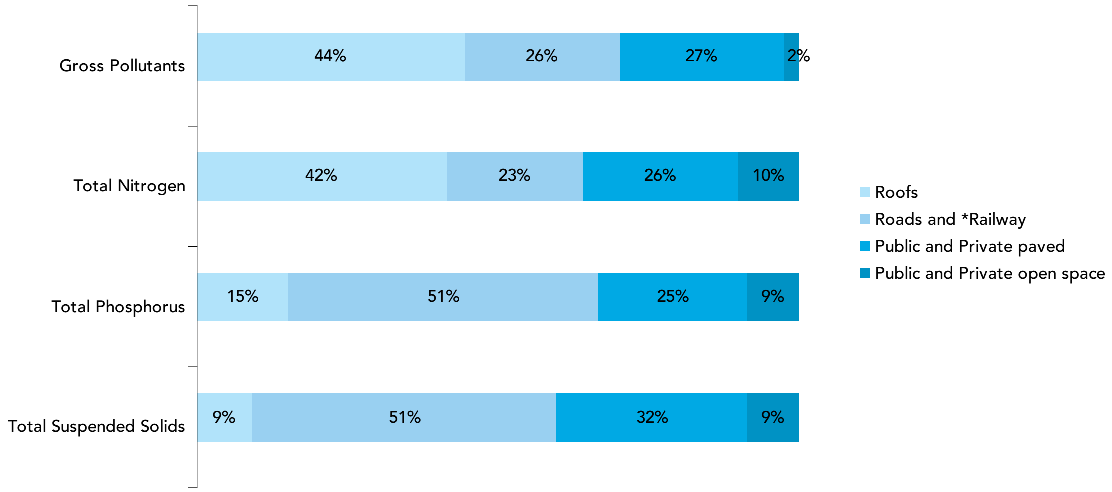
Pollutants and Hard Surfaces

The table below shows the estimated amount of pollutants currently found in stormwater in Upper Wolli Creek Subcatchment. The Best Practice Stormwater Targets shown are draft targets set by the NSW Government for new development areas. Based on these targets gross pollutants for example should be reduced by 90% from the current level of 61,400 kilograms per year to 6140 kilograms per year.

Pollutant	Estimated Mean Annual Pollutant Load (*kg/yr)	Best Practice Stormwater Targets (% reduction)	Target Pollutant Load (kg/yr)
Gross Pollutants	61,400	90%	6140
Suspended Solids **	622,000	85%	93,300
Total Phosphorus	1234	65%	432
Total Nitrogen	8880	45%	4884

* Estimated with MUSIC modelling software

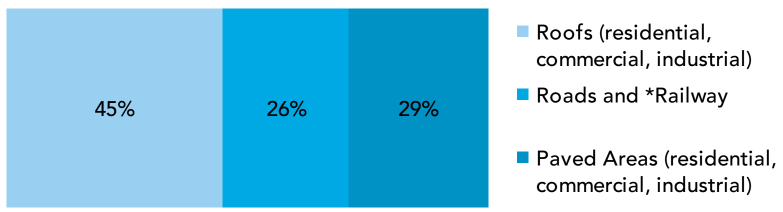
**Note: removal of suspended solids will result in a reduction of heavy metal and hydrocarbon loads



This graph shows the amounts of pollution generated from each surface type in the Subcatchment

Private property contributes significantly to gross pollutant and nitrogen loads due to the large volume of stormwater runoff from these areas. Reducing the volume of flow from these areas can help to reduce the amount of gross pollutants and nitrogen mobilised into waterways.

Public roads collect a disproportionate amount of phosphorous and suspended solids. The stormwater drainage network collects runoff from public roads and runoff from private property. It is therefore important to target both public roads and private areas in order to reduce the transport of stormwater pollutants into waterways.



Breakdown of impervious types in the Subcatchment

Water Quality Indicators	What is it?	What are their impacts?
Gross Solids	• Litter • Coarse sediments • Organic matter	• Reduce stormwater drainage capacity • Impact on visual amenity • Impact on aquatic habitats • Impact on water quality indicators such as oxygen demand, hydrocarbons and metals
Total Nitrogen Total Phosphorus	Nutrients from natural and non-natural sources including: • Atmospheric deposition • Soil particles • Human and animal faeces • Plant matter • Fertilizers • Vehicle exhaust	• Nutrients promote growth of aquatic plant life. In large concentrations they can produce algal blooms on the water surface. • Algae are microscopic plants which occur naturally in water bodies. Increased nutrients promote algal growth resulting in a build up of toxins. Toxic algal blooms cause the closure of fisheries, water farming industries and public beaches.
Suspended Solids	• Soil particles • Airborne particles • Sediment from erosion and land degradation • Leaf litter	• Suspended solids reduce the penetration of light through water impacting on the respiration of aquatic plants. • Phosphorus, heavy metals and organic chemicals utilise sediment as the medium for transportation in urban runoff.
Lead	Trace metals derived from petrol additive, hydrocarbons, paint	Impacts of metals in water bodies can vary widely. Impacts are affected by complex interactions with biophysical parameters such as pH, dissolved oxygen and temperature.
Zinc	Trace metals derived from vehicle wear, pesticides	
Hydrocarbons	• Mineral oils • Petrochemicals	• Impact on visual amenity • Impact on chemical oxygen demand
Chemical Oxygen Demand	Measure of oxygen demand from chemical oxidation of organic and inorganic material	• Chemical oxygen demand is used as an indicator of 'general health' of a water body. Organic material uses oxygen in biodegradation and chemical oxidation. • A high oxygen demand limits the capacity of waterways to support vibrant ecosystems.
Biological Oxygen Demand	Measure of oxygen demand from biodegradation and oxidation of organic material	
Total Organic Carbon	Total amount of organic material as measured in carbon	Organic matter can impact on: • Biogeochemical processes • Impacts on nutrient cycling • Biological availability • Chemical transport and interactions
Organic Matter	• Leaves • Grass clippings • Human and animal faeces	

In 2050?

* The East Hills Railway corridor accounts for only a small proportion of the Roads and Railway categoriy.

Hot Spots

OurRiver
cooks river sustainability initiative

Hot spots in the Subcatchment are areas where activities have a high impact on sustainable water management. These hot spots typically generate high pollutant or litter loads, use large amounts of water, or have water ponding problems.

Stormwater Ponding

Stormwater ponding typically occurs in low points or 'sags' where water cannot drain quickly. Ponded water can spread across the road and into adjacent properties. Ponding in the Upper Wolli Creek subcatchment occurs at:

- Bexley Road where it crosses over Wolli Creek at Bexley North;
- Properties that have structures such as fencing or garages, which block stormwater flow paths; and
- Sound walls for the M5 Motorway and East Hills Rail line have blocked overland flow paths and cause flooding in some locations.

Stormwater can transport litter to local waterways

Litter in the upper Wolli Creek Channel, Hurstville

Do you know of other hot spot areas within Upper Wolli Creek?

Dumping Hot Spots

Frequent illegal dumping areas within the subcatchment are:

- Around the back of commercial premises and in general around the Kingsgrove and Bexley North shopping areas
- Along Commercial and Vanessa Street in the industrial park
- Council parks and reserves

High litter areas within the subcatchment are:

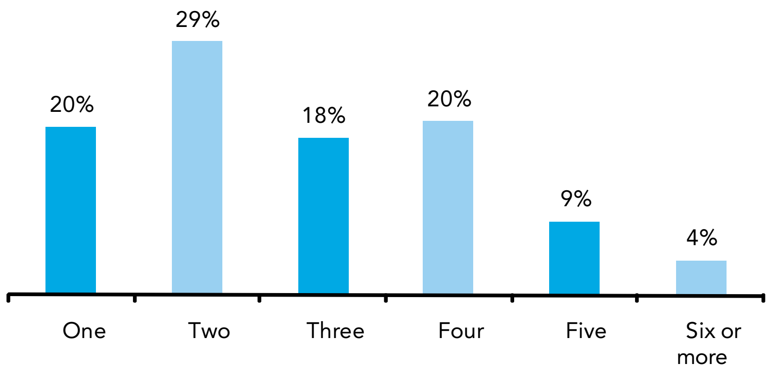
- Around train stations and schools
- Wolli Creek Channel
- Litter collects at the back of Smith Park

*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.
- Religion – 29% Catholic, 21% Eastern Orthodox, 12% no religion, 11% Anglican.
- Travel to work – car (72%), train (20%), bus (2%), walk (3%).

Household Types

How many people per dwelling:



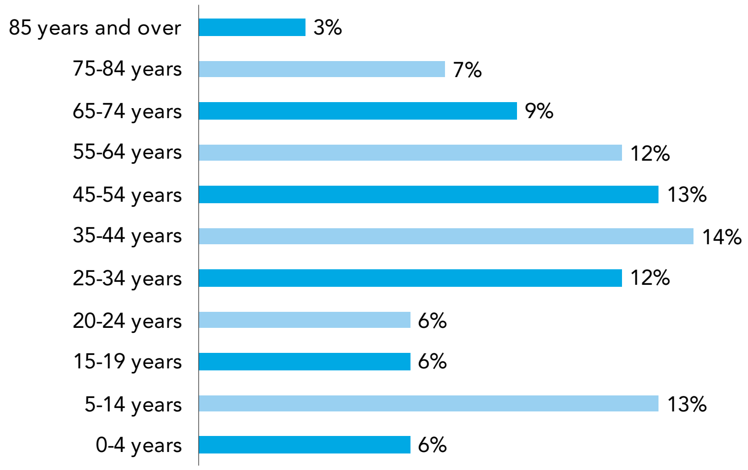
- 58% of residents are married
- 28% of residents have never been married
- 31% of families are couples with no children
- 30% of families are couples with children under 15

Education

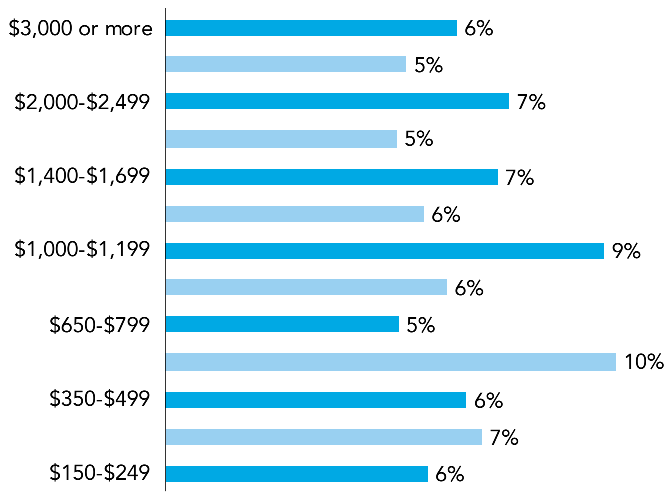
Current attendance: 28% of residents
Currently hold a non-school qualification: 40% of residents (over 15 years) have a non-school qualification
- 13% have a Bachelor degree or higher
- 17% have an Advanced Diploma, Diploma or Certificate

*All data has been sourced from the Australian Bureau of Statistics 2006 Census

Age Distribution



Weekly Household Income



Employment

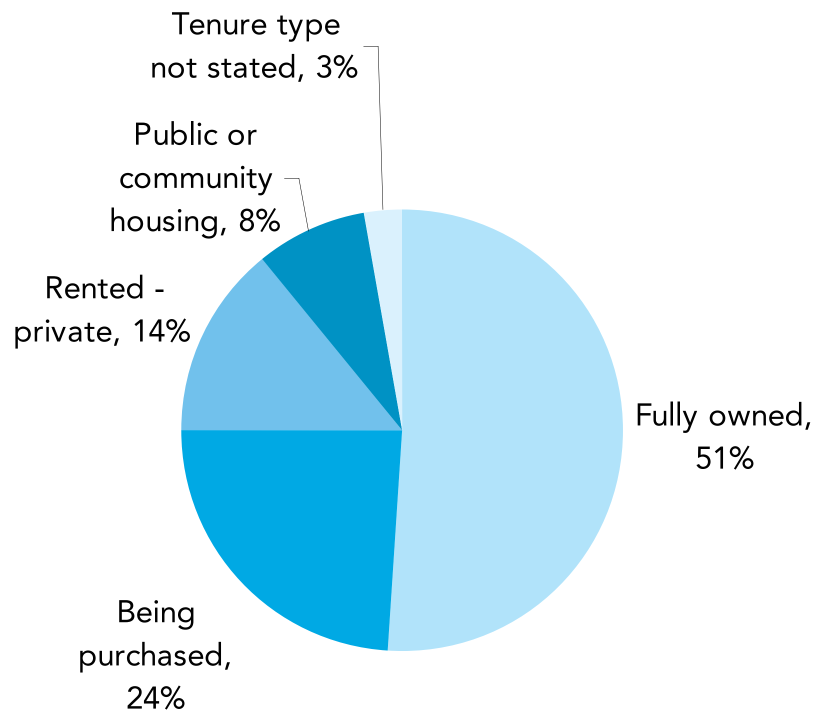
Of the total active labour force (4607 people):

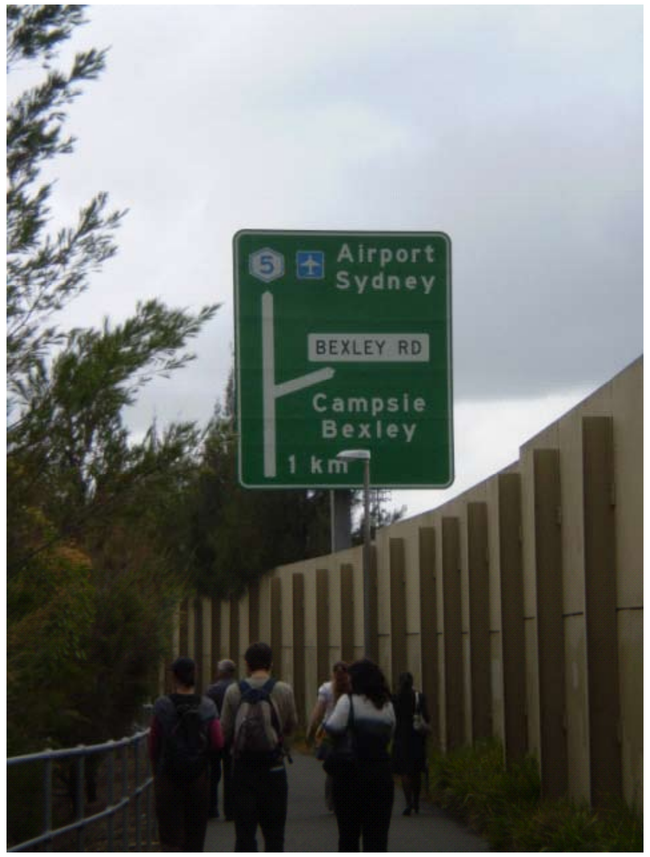
- 68% are employed full-time
- 22% are employed part-time
- 4% are unemployed

Migration

- Lived at the same address one year ago - 92%
- Lived at the same address five years ago - 72%

Household Tenure





NB: This data was collated prior to the finalisation of the Upper Wolli Creek Subcatchment boundary. The figures for the current Upper Wolli Creek Subcatchment may therefore vary slightly from those shown on this page.

Upper Wolli Creek Community Water Survey

OurRiver
cooks river sustainability initiative

Who answered the survey?

Total responses: 512 (14% of households)

Gender	51% female 49% male
Birthplace	56% Australia 12% China
Language	72% speak English at home and 6% speak Cantonese at home
Education	29% University qualification 28% Diploma, TAFE or trade qualification
Age	14% 30-39 years 20% 40-49 years 23% 60-75 years 22% 75+ years
Household Type	39% Couple with children at home 25% Couple with no children at home 15% Single person living alone
Tenure Type	65% Fully owned 24% Being purchased 6% Rented – public housing 5% Rented – other
Dwelling	91% Separate house 3% Semi-detached, terrace or townhouse 3% Flat, unit or apartment
Time in Current Residence	34% 1-10 years 18% 10-20 years 43% 20 or more years
Household Weekly Income Before Tax	18% \$200-\$399 19% \$1000 - \$1499 20% \$1500 or more

Knowledge of urban water systems

1. In my Council area, the rainwater in the street drains normally goes:

58% to the nearest waterway (correct)

35% to the sewerage system

2. From the list below, which would normally end up in the street drains?

Water From:	% Responses	
Driveways, footpaths	75%	Correct
Rainwater from the roof	69%	Correct
Other paved areas	57%	Correct
Water from the garden	50%	Correct
The washing machine	22%	Incorrect
The kitchen sink	23%	Incorrect
The shower	23%	Incorrect
The toilet	17%	Incorrect

3. On average, how many litres of water does a typical household use per day?

76% underestimated daily water use

24% chose the correct range (>400L per day)

Current water use:

1. Rainwater Tanks

88 people answered this question indicating that they currently use water from their rainwater tank.

99% use it for the garden, 67% for washing the car and 34% for toilet flushing.

2. Greywater Systems

218 people answered this question indicating that they currently reuse greywater.

91% use it for the garden, 44% for toilet flushing, 32% for washing the car.

14 households have a greywater and/or treatment system installed.

3. Water Saving Devices

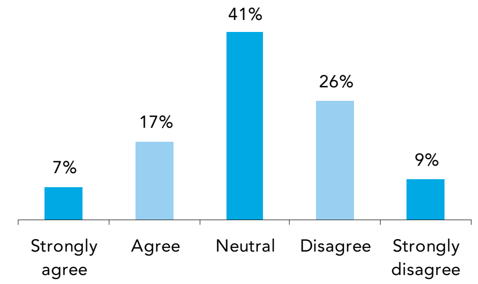
81% of households who answered this question have water saving devices such as water saving showerheads, tap aerators and toilet flush water savers.

Receptivity to using rain and recycled water

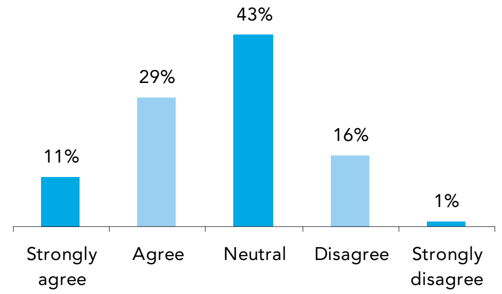
The percentage of people who would consider using rainwater and greywater and how they would use it is shown below:

	Filtered Rainwater	Treated Recycled Water
Cooking	2	2
Drinking	8	2
Nothing	8	5
Showering	25	7
Washing clothes	43	17
Washing the car	76	60
Flushing the toilet	82	76
Watering the garden	95	88

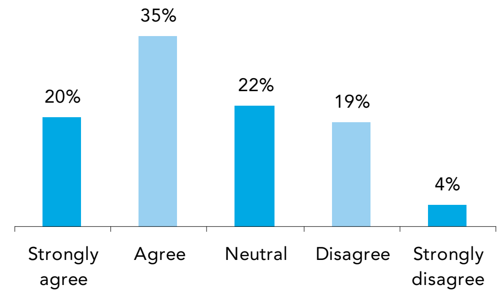
Attitudes



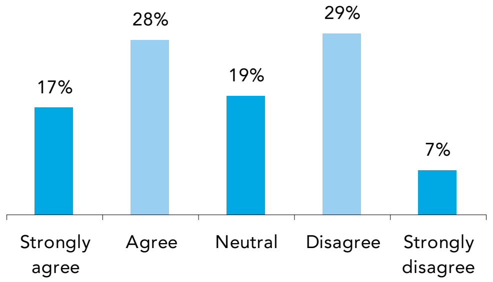
a) 'Jobs are more important than the environment'



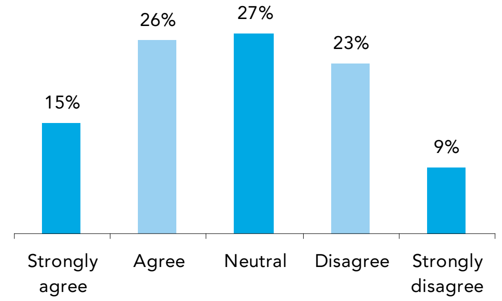
b) 'Access to a healthy natural environment is more important than access to community facilities'



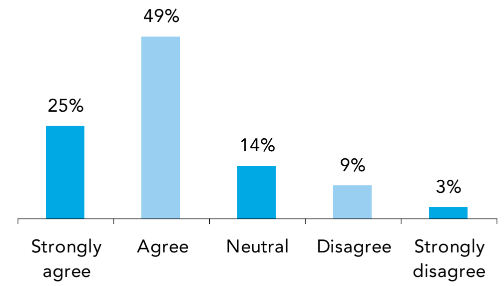
c) 'My daily activities have little negative impact on the waterway environment'



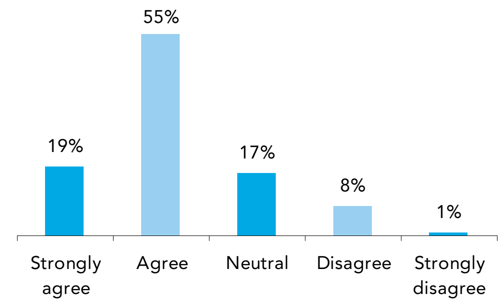
d) 'Government agencies should have the main responsibility for the waterway environment rather than the individual.'



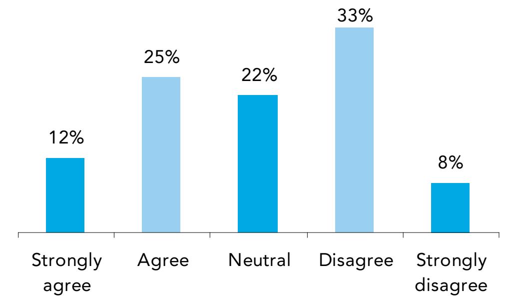
e) 'We should aim for the same waterway conditions as before the Europeans arrived over 200 years ago.'



f) 'I would reduce my shower time by half to save limited water resources.'



g) 'Most people want to help improve the health of the waterway environment.'



h) 'Laws are more effective than education for protecting the waterway environment.'

Questions to think about

OurRiver
cooks river sustainability initiative

1. How much of the information is new to you?	2. What is the most surprising information?	3. How sustainable is the current water cycle shown on page 6?	4. What part of the water cycle needs the most significant change?