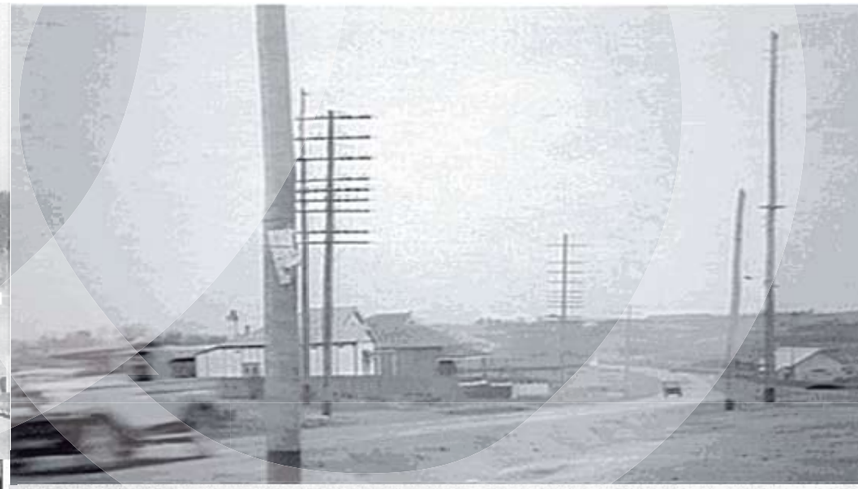
Cooks River Sustainability Initiative

Planning Rookwood Road Subcatchment



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Contents

Front Cover: (Clockwise from left) 'Focus on the history of Australian radio astronomy', viewed 3 July 2009, <www.atrf.csiro.au/news/newsletter/oct01/focus-hist.htm>; 'Pipe head Potts Hill', viewed 3 July 2009, <wwww.holroyd.nsw.gov.au>; 'Hume Highway Chullora' (c.1940), Government Printing Office 1-23478; 'Settlers cottage in Bankstown area' (c.1884) and ' Liverpool Road' (c. 1909) both from Lawrence J., Madden B. and Muir L. (1999) 'A pictorial history of Canterbury Bankstown', Kingsclear Books, Alexandria, p24.

Introduction

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

Partnership

OurRiver is a partnership between eight councils within the Cooks River Catchment which are Ashfield, Bankstown, Canterbury, City of Sydney, Hurstville, Marrickville, Rockdale 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
- Develop a Vision and Action Plan for six local subcatchments

The Cooks River catchment (area outlined in black) is approximately 100 square kilometres and is made up of many smaller subcatchments.

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

Why is this project unique?

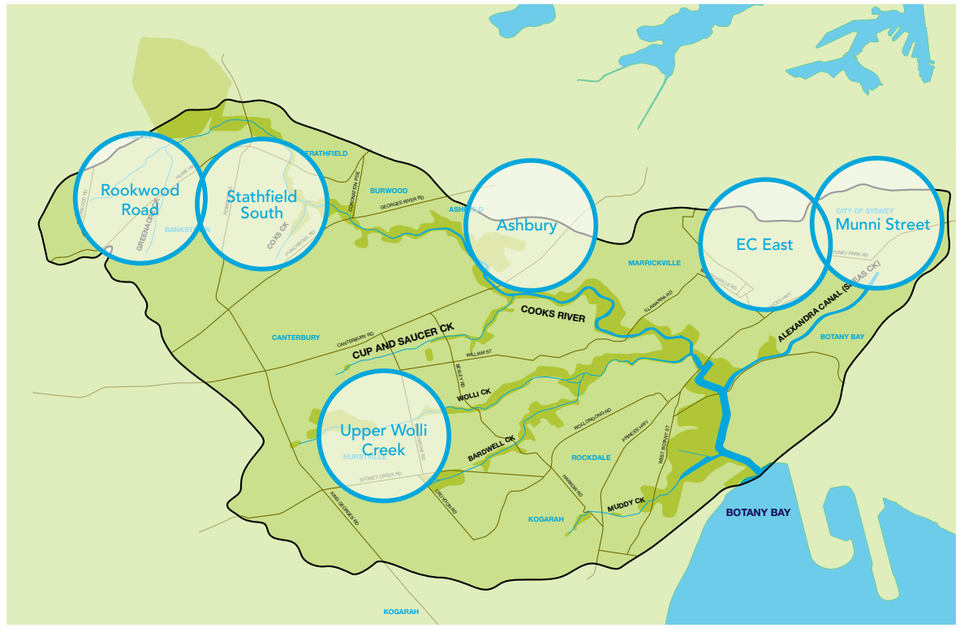
The OurRiver project acknowledges and builds on previous work and studies completed by other government agencies and community groups. It is however, taking a new approach to improving the long term health of the Cooks River. This includes:

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

How is this project being funded?

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

Photo by Tanja Pokrajac



OurRiver Subcatchments

The Cooks River Catchment

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There are 8 tributaries to Cooks River:

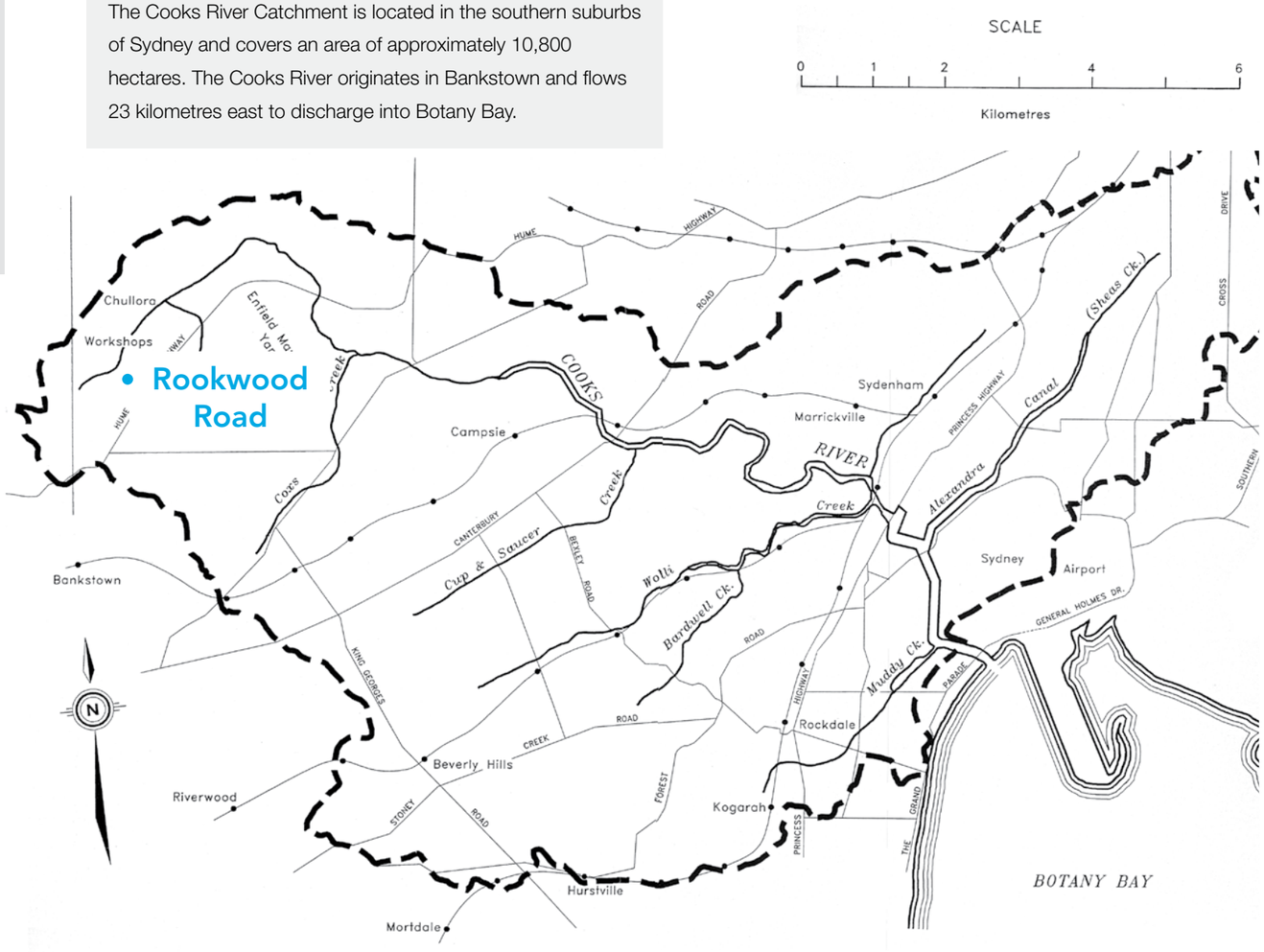
- Wolli Creek
- Bardwell Creek
- Muddy Creek
- Sheas Creek / Alexandra Canal
- Cup and Saucer Creek
- Coxs Creek
- Fresh Water Creek

There are 13 councils in the Cooks River Catchment:

Council	Percentage of Catchment
Ashfield	0.2%
Auburn	0.9%
Bankstown	9.1%
Botany Bay	5.9%
Burwood	2%
Canterbury	25.1%
Hurstville	8.2%
Kogarah	0.5%
Marrickville	11.3%
Randwick	1.2%
Rockdale	18.2%
Strathfield	6.8%
Sydney City	10.5%

Cooks River Catchment

The Cooks River Catchment is located in the southern suburbs of Sydney and covers an area of approximately 10,800 hectares. The Cooks River originates in Bankstown and flows 23 kilometres east to discharge into Botany Bay.



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 the 1980s 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. Water quality with respect to primary and secondary contact recreation is considered poor.

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. Pollutants 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

The area now known as Bankstown was previously a meeting place for various Aboriginal peoples. The traditional custodians of the area were the Bidjigal people of the Eora nation and the Cabrogal people of the Darug nation. At the time they lived as traditional owners of the land, the Aboriginal peoples of Australia were amongst the most culturally and linguistically diverse people of the world.

Whilst there is limited documented information regarding local Aboriginal Heritage in the Bankstown area, there is increasing interest and demand for this cultural information both from the Aboriginal and wider community. Aboriginal sites, which have the remains of prehistoric and historic occupation, are a very important part of our cultural heritage. Equally important is the significance these sites have for Aboriginal communities as they provide a direct link with their traditional culture. Further information about the Aboriginal Sites Register of NSW can be found on the National Parks & Wildlife Service at

http://www.environment.nsw.gov.au/nationalparks/

Urban Water Management

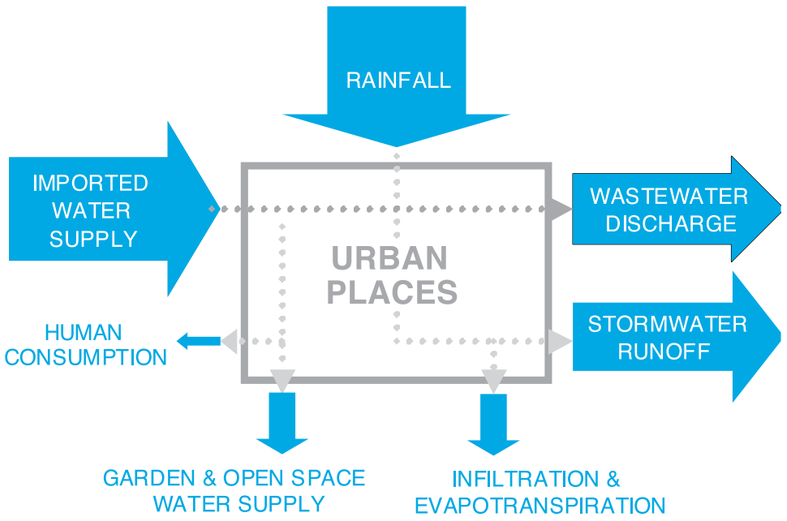
OurRiver is funded by the NSW Environmental Trust's Urban Sustainability Grants Program. It aims to plan for managing water sustainably in urban environments such as the Rookwood Road Subcatchment. The project addresses three problems in conventional urban water management:

1. Technical experts have traditionally been responsible for developing solutions to complex urban water problems. Other thinkers are also needed, 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:

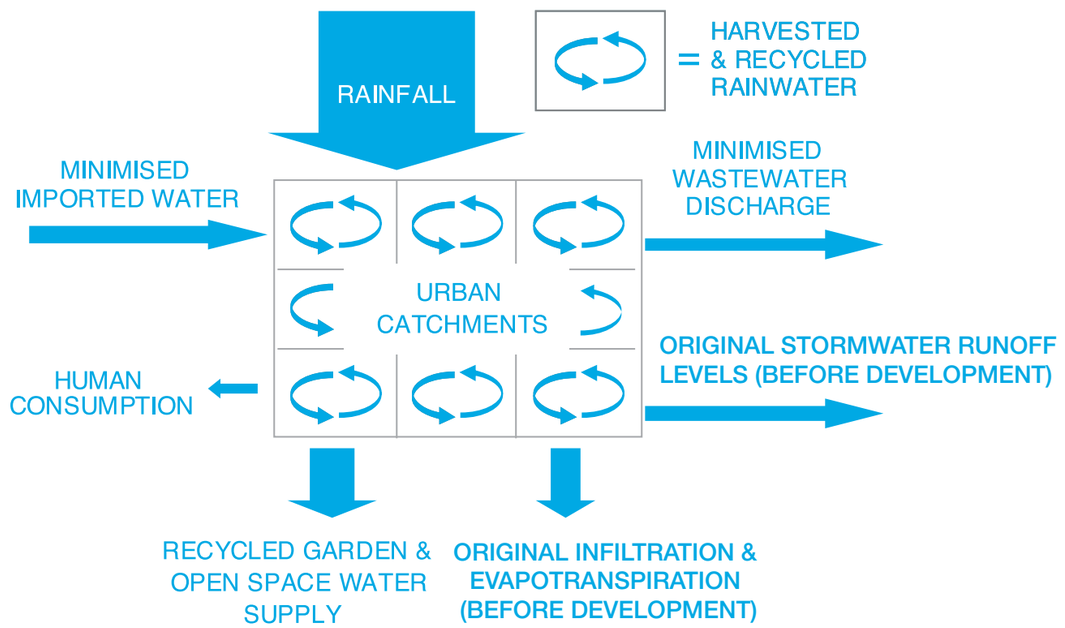
- Reducing the amount of wastewater leaving a catchment that may cause pollution in other areas (e.g. ocean outfalls)
- Reducing the reliance on drinking quality (potable) water brought in from outside the catchment
- Using water appropriately i.e. using potable water for consumption only – not for watering the garden or flushing the toilet
- 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

Sustainable Bankstown Strategy

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Bankstown City Council is developing the Sustainable Bankstown Strategy which will provide an integrated approach to environmental management, sustainability and land use planning. The plan will also provide a city-wide planning framework for accommodating residential and employment growth.

Local Area Plan

The Sustainable Bankstown Plan will be implemented though six Local Area Plans that will be embedded within it. Planning at a local scale will ensure solutions are tailored to local conditions and needs. Rookwood Road Subcatchment falls within Local Area No. 5 (see map). **Initial vision sessions for Local Area No. 5 are scheduled to take place in August and September 2009**.

What will the Local Area Plan do?

The Plan will:

- Identify areas where development should and should not occur
- Address the protection and enhancement of the City's natural environment
- Include actions to foster employment growth in the city
- Help ensure that Bankstown has a cohesive social fabric
- Identify what infrastructure upgrades will be needed

What issues will the Plan cover?

The Plan will look at water management including flooding, stormwater and Water Sensitive Urban Design (see page 18 for explanation of this term) along with a host of other sustainability issues including climate change, transport, social harmony, economic sustainability and future development/infrastructure.

Beacon Projects

The Strategy will also identify a number of "beacon projects". These projects will showcase a number of innovative sustainability projects and are aimed to demonstrate that local government can have a significant role in enhancing sustainability, particularly when working in partnership with the community.

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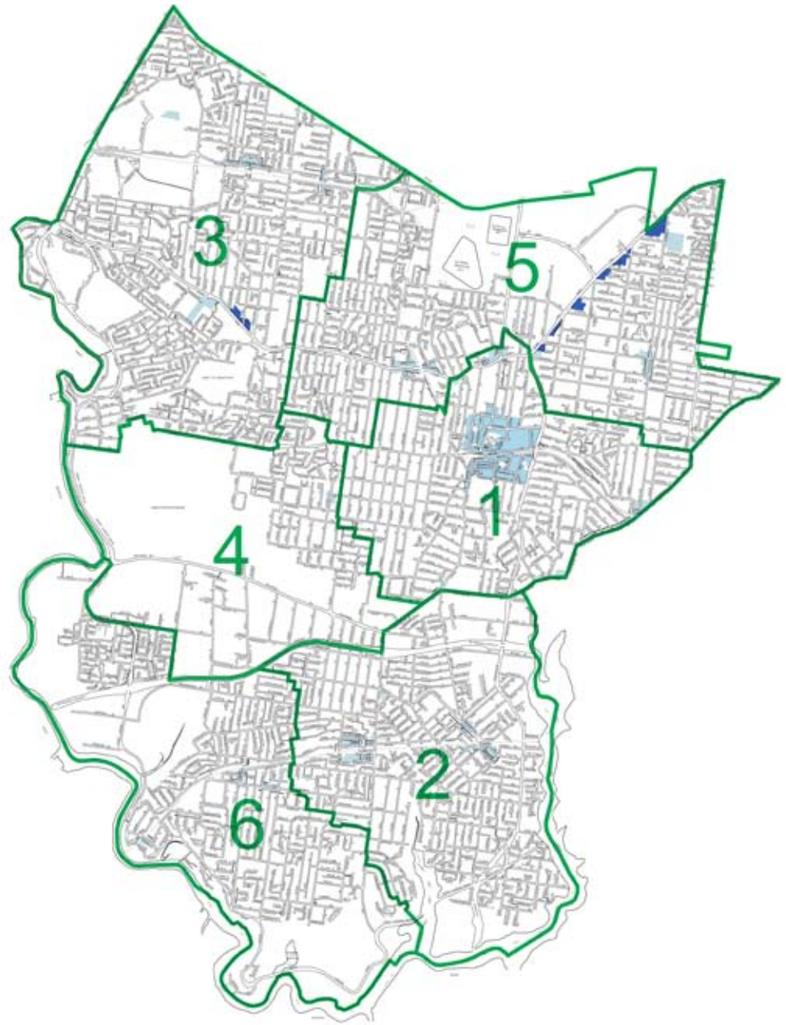

Bankstown Local Planning Areas

Rookwood Road - What Have We Done So Far?

What have we done so far?

- Gained a good understanding of the demographics in Rookwood Road Subcatchment (see page 14)
- Surveyed residents about their attitudes, knowledge and current behavior in relation to water conservation and use (see page 15 for results of the survey)
- 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)

What is happening with water now?

In 2009:

- 98% of drinking quality water in Rookwood Road Subcatchment is used for purposes other than drinking and ends up in the ocean as wastewater
- 66% of rainwater runs directly into the Cooks River because 68% of the Rookwood Road Subcatchment is impervious (sealed surfaces that do not allow water to soak in)
- Rainwater runoff from the roofs and streets of the Rookwood Road Subcatchment carries sediments and pollution to the river
- 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
- Sydney's dam storage water supply can not 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 the Rookwood Road Subcatchment in 2050. The results will contribute to a community water vision which will be the basis for planning at the community water planning forum to be held in October 2009.

Why a community water vision?

Community engagement during planning for the Rookwood Road subcatchment will make use of local knowledge and ensure that the solutions and strategies developed are right for the subcatchment and its community. This includes the identification of on-ground water solutions.

How to use this booklet

This booklet presents information about the urban water cycle in the Rookwood Road subcatchment. As you read the booklet, think ahead to the year 2050 and imagine how things may have changed by then. Please make notes of your ideas in this booklet and bring them along to the planning forum.

Rookwood Road Subcatchment Water Cycle - Now

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This page presents an overview of the water cycle in the Rookwood Road Subcatchment. These figures are based on data from the Bureau of Meteorology and Sydney Water, and results of computer stormwater modelling.

The water cycle highlights the amount of potable (drinking quality) water savings that can be made by harvesting and using rainwater, stormwater and wastewater. Stormwater and wastewater reuse also provides an opportunity to reduce the speed of runoff, and to reduce pollutant loads from these sources.

Rainfall
3511ML/yr
100%

Potable water import
845 ML/yr (2006)
100%

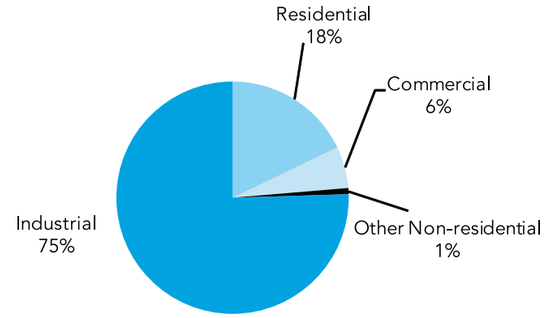
Wastewater
828 ML/yr
98%

Garden and open space watering
9 ML/yr
1%

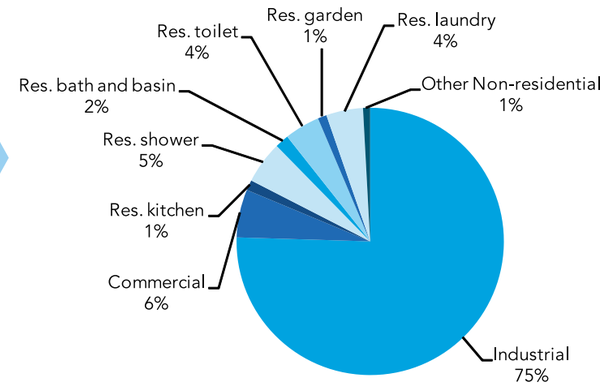
Consumed by residents
8 ML/yr
1%

Stormwater infiltration and evapotranspiration
1,181 ML/yr
34%

Stormwater runoff to Cooks River
2,330 ML/yr
66%



Consumption by Sector



End use consumption

Do you think the current water cycle is sustainable? Why or why not?

Rookwood Road Subcatchment Water Cycle – 2030?

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What should the water cycle look like in 2050?

Rainfall
3511ML/yr
100%

Potable water import
? ML/yr
? %

Wastewater
? ML/yr
? %

Garden and open space watering
? %ML/yr
? %

Consumed by
residents
? ML/yr
? %

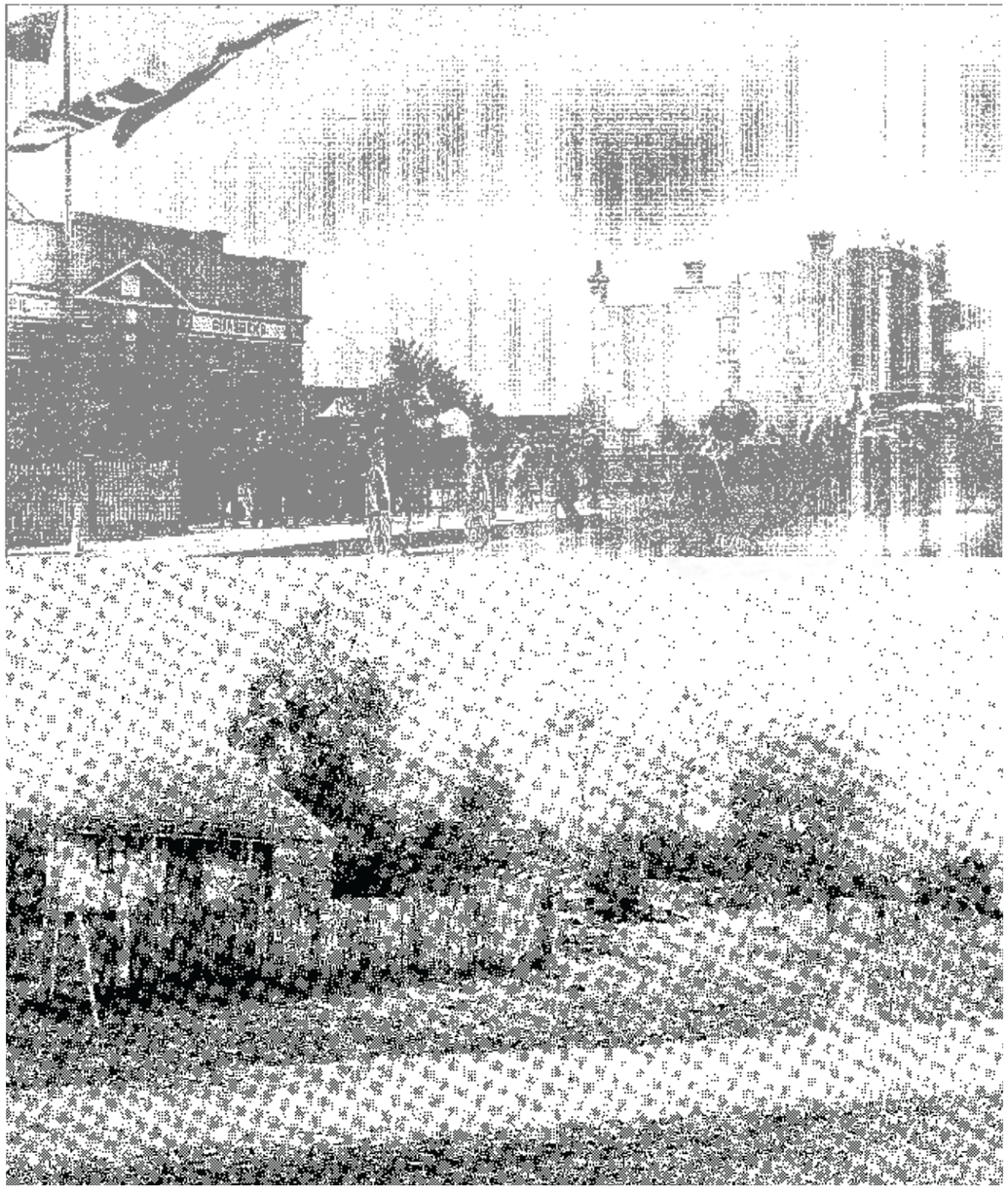
Stormwater infiltration
and evapotranspiration
? ML/yr

?%

?%

Stormwater runoff to
Cooks River
? ML/yr

What should the water cycle look like in 2050?



Top: McQuillian's Inn at the corner of Rookwood and Liverpoll roads 1907.
Bottom: Settler's cottage in the Bankstown area 1884.
Both pictures reproduced from 'A pictorial History of Canterbury Bankstown' by Lawrence J, Madden B and Muir L 1999.

References
Botany Bay Catchment Alliance, Projects, viewed 3 July 2009 http://www.botanybay.info/projects>
Lawrence J, Madden B and Muir LA (1999), 'Pictorial History of Canterbury Bankstown', Alexandria.
Sydney Water, Potts Hill Redevelopment, viewed 3 July 2009 <http://www.sydneywater.com.au/WhoWeAre/PottsHill/>
Wikipedia, Bankstown, NSW, viewed 3 July 2009 http://en.wikipedia.org/wiki/Bankstown,_New_South_Wales'

Rookwood Road Subcatchment history since European settlement

Year	What Happened
To 1795	Aboriginal people lived successfully in the area for thousands of years.
1790	John McEntire, Governor Phillip's game keeper, speared by Pemulwuy while hunting for kangaroo south of the Cooks River.
1795	Matthew Flinders, then a Royal Navy Midshipman, together with George Bass, and William Martin guided their eight foot Tom Thumb up the winding Georges River to the site now known as Bankstown. The naming of Banks' Town was in honour of Sir Joseph Banks, who sailed with Captain James Cook from 1768-1771.
1814	Liverpool Road (Hume Highway) constructed at a cost of one hundred and thirty pounds per mile.
1822	The first inn in North Bankstown opened, named the 'Crooked Billet' operated by Sam Pugh.
1833	Hyde Park Estate (now Potts Hill), at 1,100 acres (445 hectares) in size, was granted to HG Douglas.
1834	Joseph Hyde Potts, an accountant in the Bank of New South Wales, purchases Hyde Park Estate. By 1835 Potts' holdings have increased to 2,564 acres (1,038 hectares).
1863	The first Post Office in Bankstown opened on 1 April 1863.
1888	The first reservoir at Potts Hill was completed, a vital part of the Sydney water supply system.
1895	The first Bankstown Council election took place on 2 November 1895. There were only 884 electors on the roll.
1909	The railway from Belmore to Bankstown was opened on 14 April 1909.
1910	Potts Hill Reservoir capacity now 2 days.
1923	Work on Potts Hill reservoir No. 2 commenced in 1913, completed by 1923.
1924	Work on Chullora Rail Yards commences.
1952	Potts Hill Reservoir used as a site for radio telescopes by the CSIRO when studying radiation emited by the sun.
Early 1970s	RSPCA animal shelter at Yagoona opens, Bankstown now a highly urbanised suburb.
1980	Bankstown was proclaimed a City on 27 May 1980, during the visit of Her Majesty Queen Elizabeth II.
1998	Freshwater Creek Wetlands constructed at the head of the Cooks River after many years of lobbying by the South West Environment Centre.

Changing Land Use in Rookwood Road

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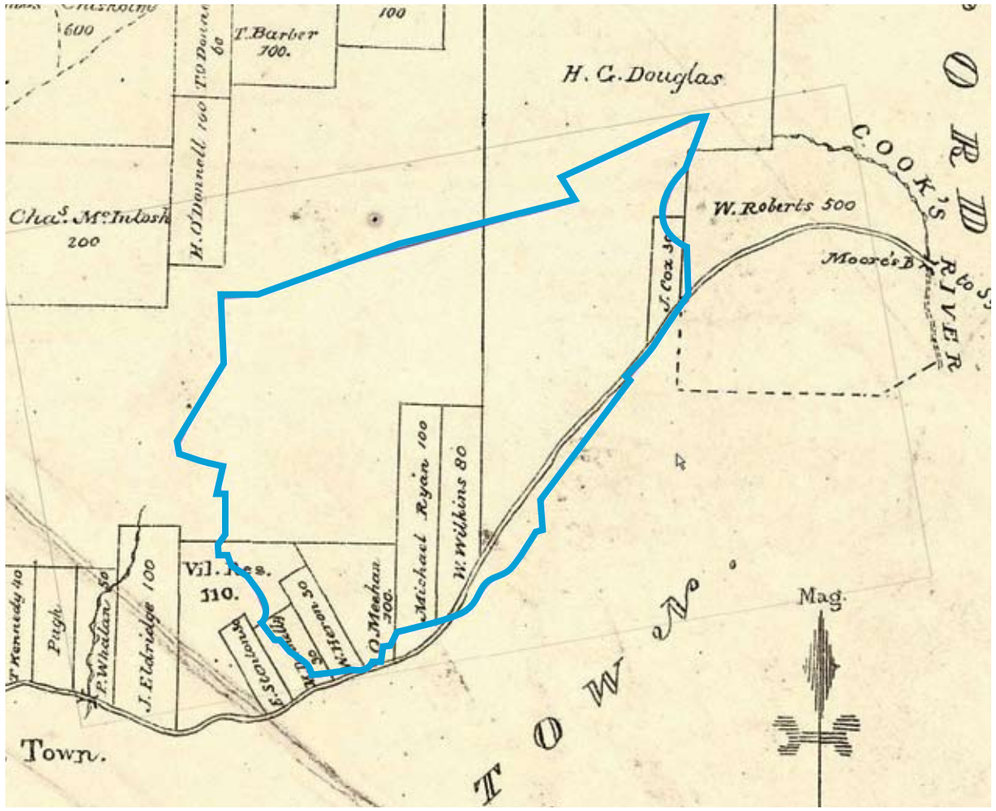
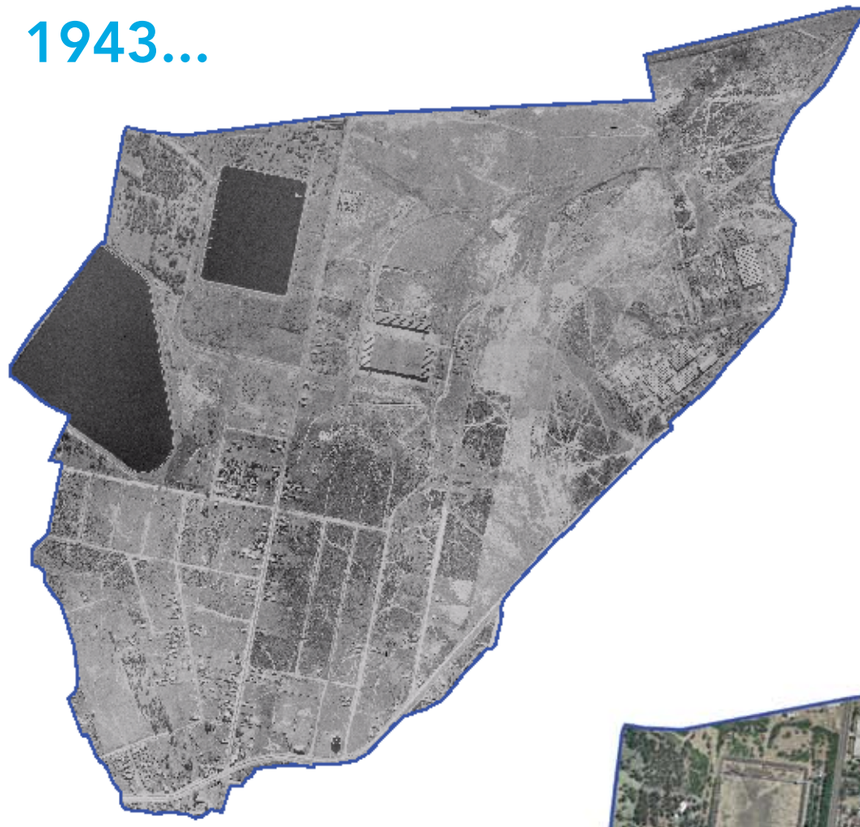


1830s...

1943...



Today...

Land Use - Today

Residential Dwelling Types

Subcatchment Size – 378 Hectares
Number of residential dwellings - 785

58%
Separate Houses

27%
1 storey semi, row or terrace house

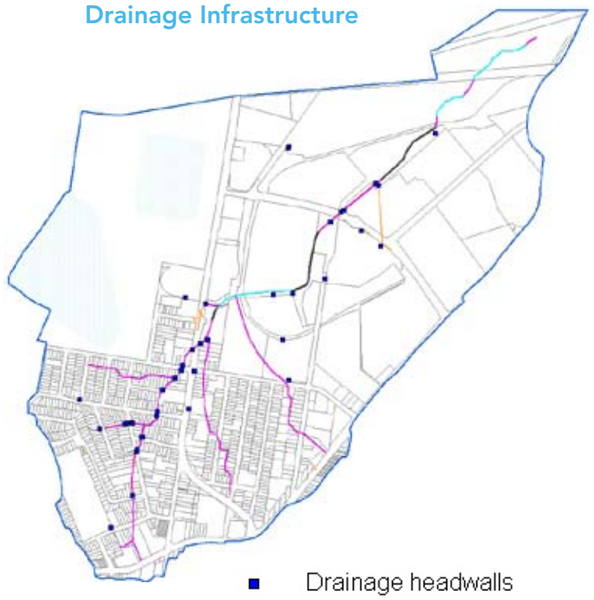
7%
3 or more storey block - flat, unit, apartment

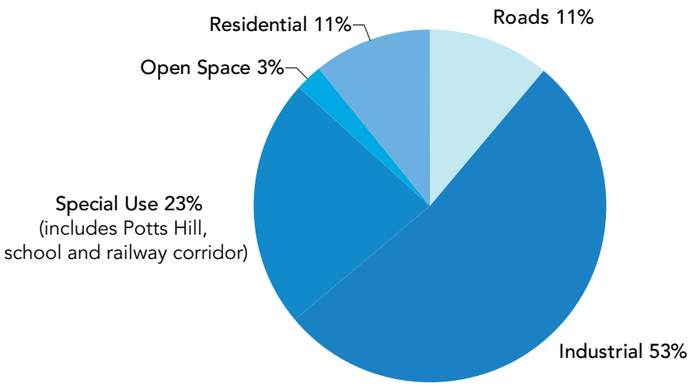
5%
2 storey semi, row or terrace house

2%
1 or 2 storey block - flat, unit, apartment

0.1%
Unit or flat attached to shop or house

Rookwood Road Stormwater Drainage Infrastructure





Land Use Zonings

Pollutants and Hard Surfaces

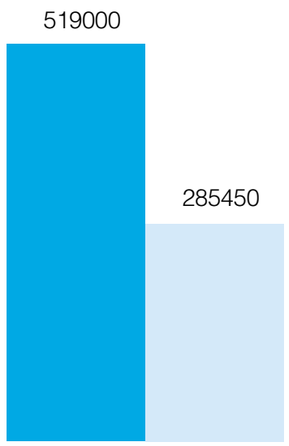
Pollution and surface types in the Rookwood Road Subcatchment

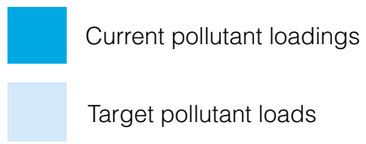
Approximately 68% of the Rookwood Road Subcatchment is made up of hard or paved surfaces including roads, pavements roofs and railway tracks. The large proportion of hard surfaces reflects the highly industrial character of the area and high residential density of Sydney in general. More than 90% of pollutants found in stormwater that flows from the Subcatchment into the Cooks River comes from these hard surfaces (see pie charts on next page).

The graphs below show 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 (see table to right for definition), should be reduced by 90%, total suspended solids# by 85%, total Phosphorous by 65% and total Nitrogen by 45% from their current levels.

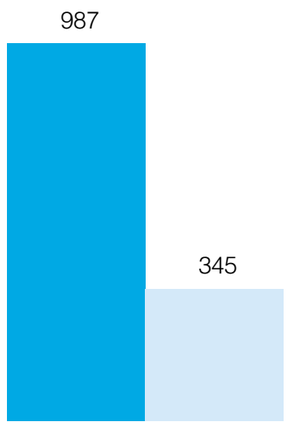
Gross Pollutants (kg/yr)

Total Suspended Solids (kg/yr)

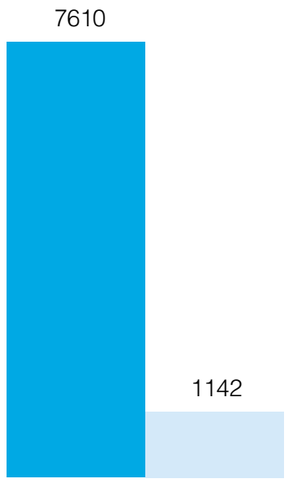




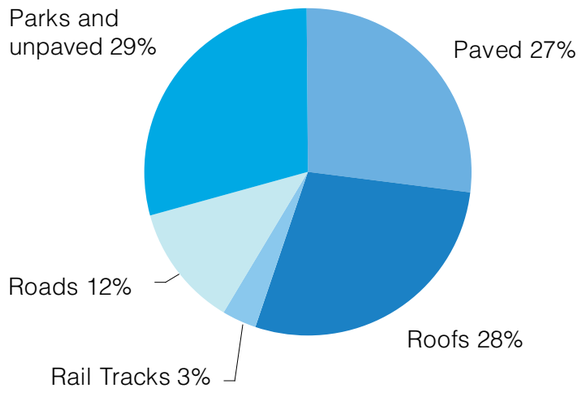
Total Phosphorus (kg/yr)



Total Nitrogen (kg/yr)



Surfaces types within the Rookwood Road subcatchment



*Estimated with MUSIC computer modelling software
#Note: removal of suspended solids will result in a reduction of heavy metals and hydrocarbon loads

Water Quality Indicators	What is it?	What are their impacts?
Gross Pollutants	• 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 Phosphorous	Nutrients from natural and non-natural sources including: • Atmospheric deposition • Soil particles • Human and animal faeces • Decaying plant matter • Fertilisers and detergents • Vehicle exhaust	• Nutrients promote growth of aquatic plant life. In large concentrations they can promote 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	• Reduce the penetration of light through water impacting on the respirations and therefore growth of aquatic plants • Phosphorus, heavy metals and organic chemicals utilise sediment as the medium for transportation in urban runoff • Surface water temperatures are also increased as suspended solids absorb heat from sunlight
Lead	Trace metals derived from petrol additives, 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. • Concentrate in aquatic flora and fauna and reduce photosynthesis in aquatic flora
Zinc	Trace metals derived from vehicle wear, pesticides	• Concentrate in tissues of aquatic flora and fauna
Hydrocarbons	• Mineral oils • Petrochemicals	• Impact on visual amenity • Impact on chemical oxygen demand • Toxicity
Chemical Oxygen Demand	Measure of oxygen demand from chemical oxidation of organic and inorganic material.	• Used as and indicator of “general health” of a water body. Organic material uses oxygen in biodegradation and chemical oxidation • High oxygen demand will limit capacity 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	

Pollutants and Hard Surfaces

The pie graphs on the right illustrate the amount of pollution (total suspended solids, total nitrogen, total phosphorous and gross pollutants) generated by each surface type in the Rookwood Road* Subcatchment.

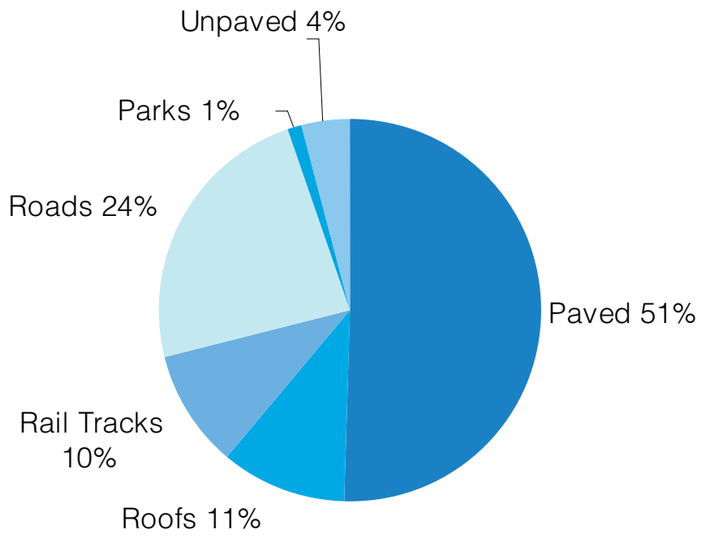
For example from the total amount of suspended solids estimated to be washed into the Subcatchment's waterways 50.5% come from the paved areas (driveways, carparks, footpaths, paved areas around buildings etc.)

Roads account for 23.7% of suspended solids in the Subcatchment's stormwater, roofs 10.7%, rail tracks 9.9%, unpaved areas 4.2% and parks 1%.

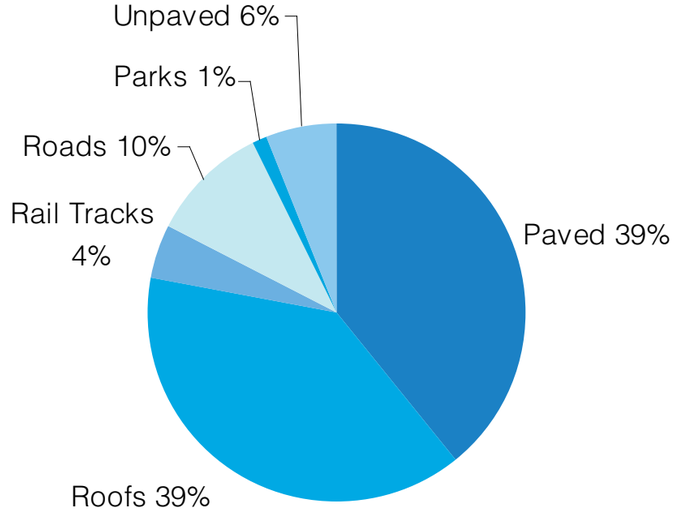
In each of the graphs paved areas contribute the largest amount of each pollutant type, followed by roofs for total nitrogen and gross pollutants . For total phosphorous and suspended solids, roads are the next largest contributor after paved areas.

To reduce current pollution loads in stormwater within the Rookwood Road Subcatchment to the target amounts shown on the previous page, stormwater from the largest contributors, paved areas, roof and roads should be treated and/or collected for re-use.

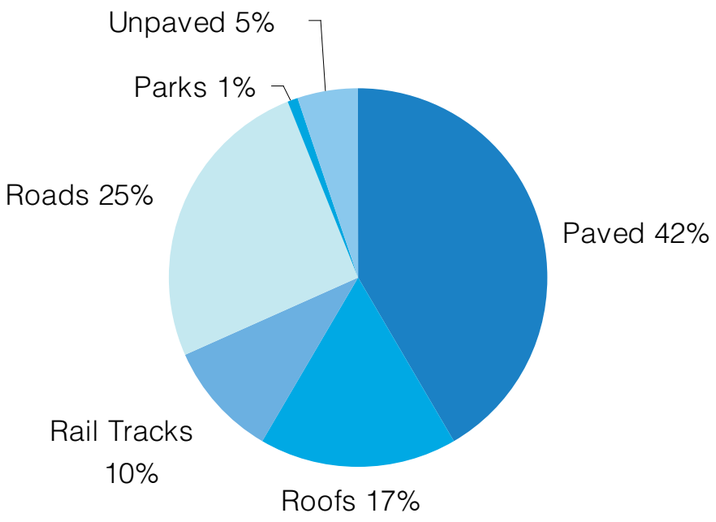
*Values in charts estimated using MUSIC modelling computer software



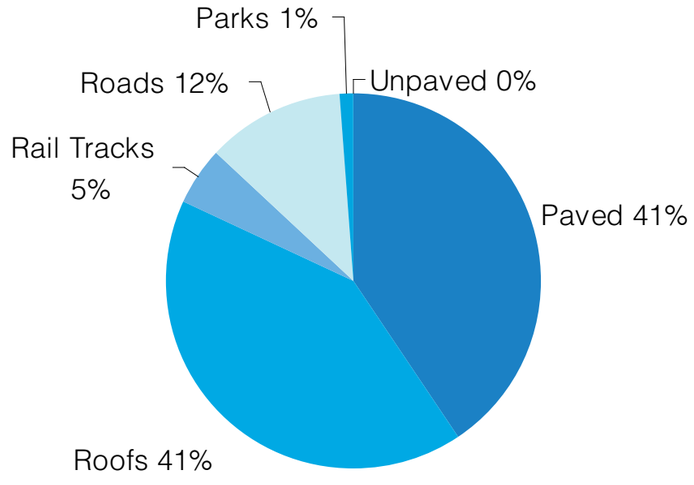
Total Suspended Solids



Total Nitrogen



Total Phosphorous

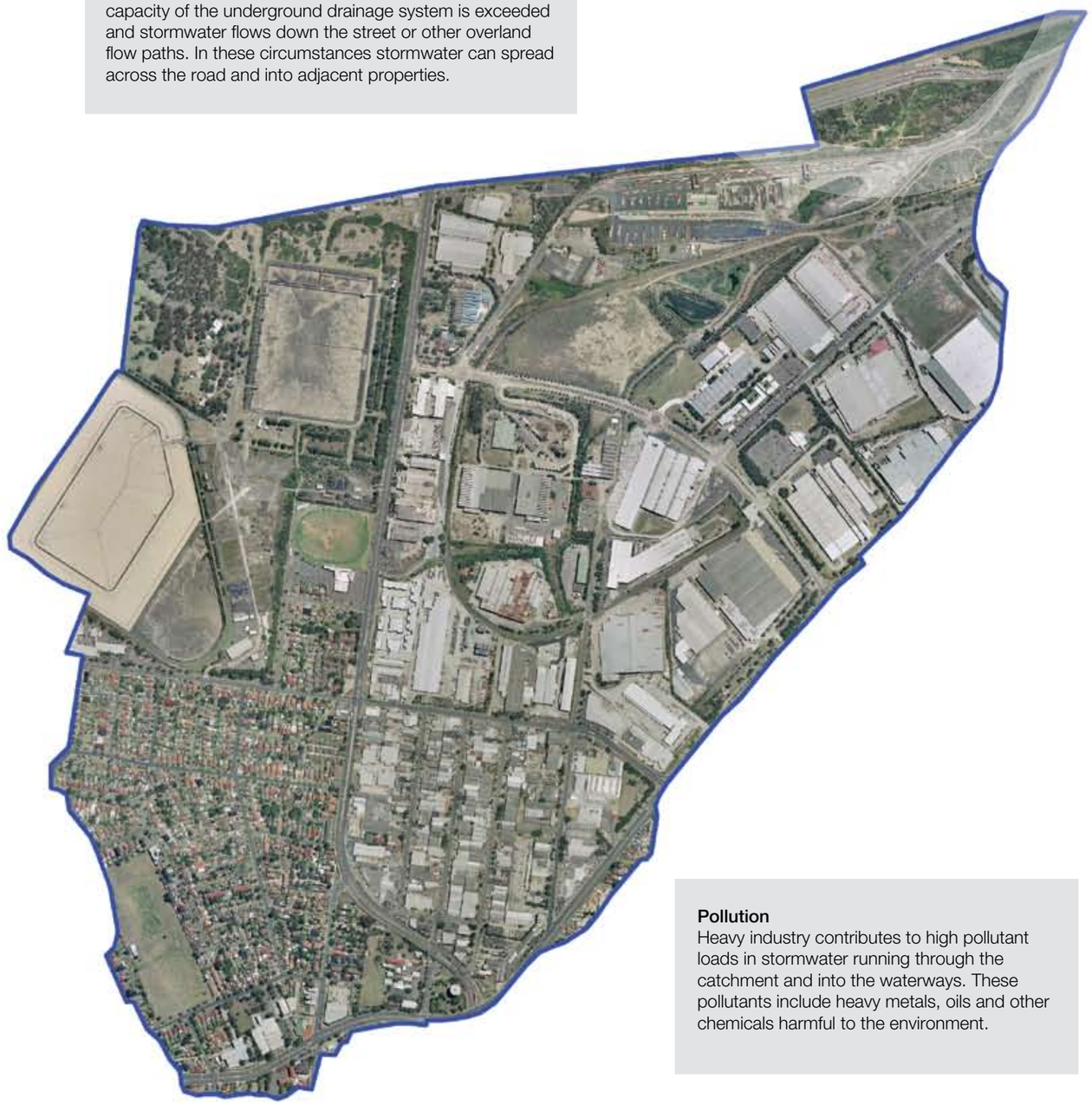


Gross Pollutants

Pollution and Flooding Hotspots

Do you know of any pollution and flooding hotpots in the Rookwood Road Subcatchment

Stormwater Ponding and Overland Flows
Stormwater ponding occurs in low points or 'sags' where water cannot drain quickly. Overland flows occur when the capacity of the underground drainage system is exceeded and stormwater flows down the street or other overland flow paths. In these circumstances stormwater can spread across the road and into adjacent properties.



Litter and Illegal Dumping
Litter and illegal dumping are major problems along roadsides, in vacant lots and in small bushland areas within the Subcatchment.

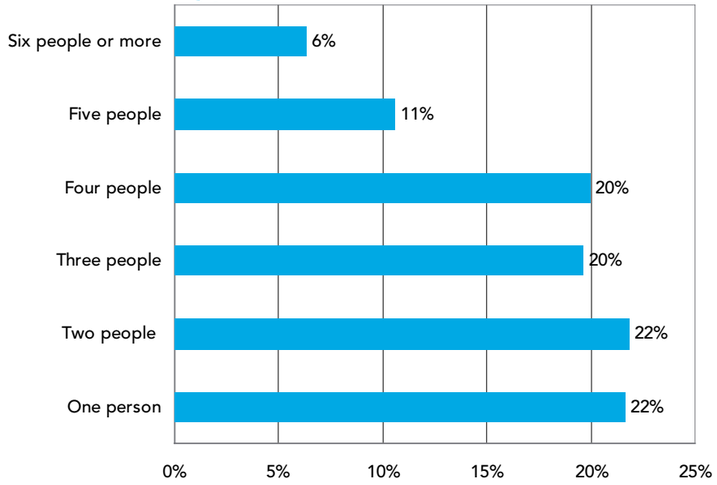
Pollution
Heavy industry contributes to high pollutant loads in stormwater running through the catchment and into the waterways. These pollutants include heavy metals, oils and other chemicals harmful to the environment.

Social Characteristics

Key Statistics

- Population – 2,265 residents
- Origin – 45% born overseas: Vietnam (12%) followed by Lebanon (7%), Macedonia and New Zealand (2%),
- Languages at home – 61% non-English including Arabic (20%) Vietnamese (17%), Cantonese (4%), Macedonian (3%)
- Religion – 55% Christian, 11% Buddhist, 16% Islam, 1% Hindu 5% no religion
- Travel to work - Car/Truck (83%), Train (10%), Bus (2%), walk (2%), bicycle or motorised bike (0%)

Household Types



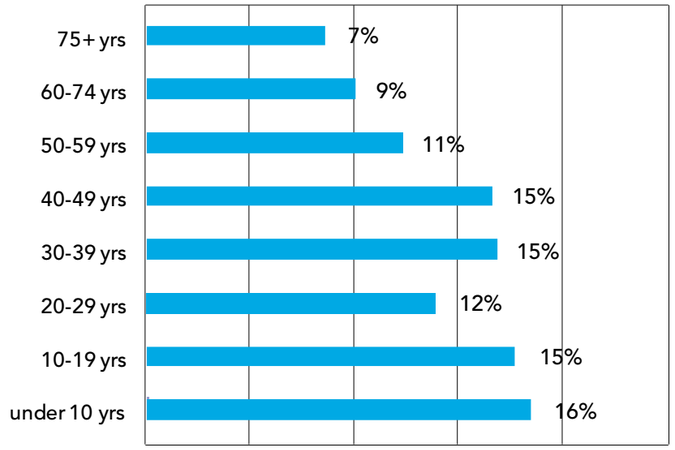
- 53 % of residents are married
- 56 % of residents are living as a couple with children
- 19% of residents are single parents
- 22% of residents are living as a couple with no children

Education

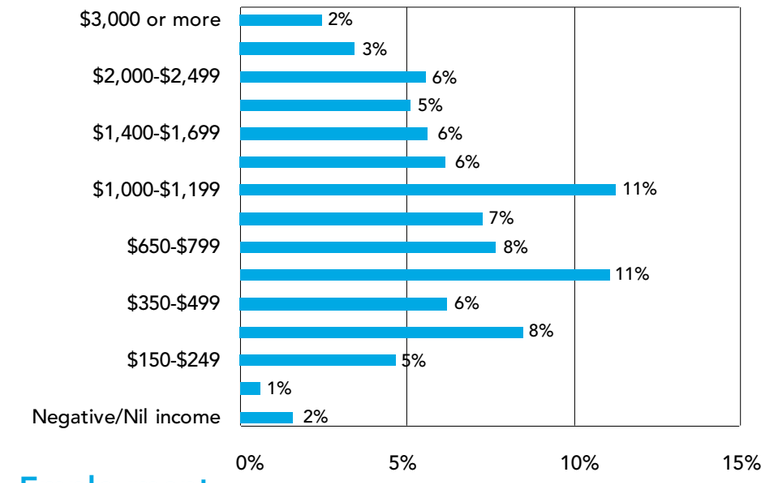
- 27% of residents are currently attending an educational institution
- 22% of residents (over 15yrs) currently hold a non - school qualification including 6% Bachelors Degree or higher and 15% advanced Diploma, Diploma or Certificate

All data sourced from the Australian Bureau of Statistics 2006 Census

Age Distribution



Weekly Household Income



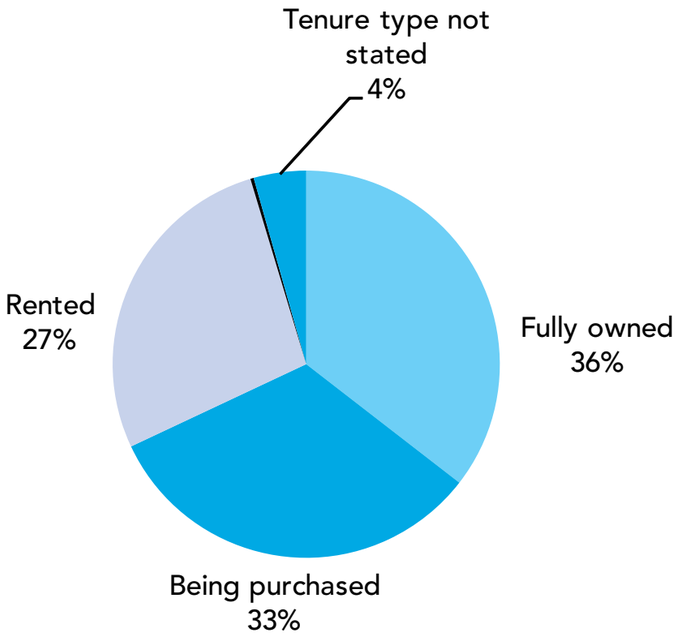
Employment

Of the active labour force (884 residents)

- 60% are employed full time
- 23% are employed part time
- 8% are unemployed

Occupation

- 19% clerical and administrative
- 16% technicians and trade workers
- 13% professionals



Household Tenure

Rookwood Road Community Water Survey

OurRiver
cooks river sustainability initiative

Who answered the survey?

(Total: 104 respondents (10.5% of households))

Gender	36% Males 64% Females
Origin	57% born in Australia
Language	79% speak English at home 7% Vietnamese
Education	31% - High School (Yr 10 or 12) 17% - Uni Qualification 42% - TAFE Trade Cert
Age	30 - 39 years - 17% 50-59 years - 21% 60-75 years - 24% 75+ years - 18%
Household Type	29% Couple with children at home 25% Couple with no children at home 24% Single person living alone
Tenure Type	55% Fully own home 32% Buying home 13% Rental – public 1% Rental - private
Dwelling	71% Separate house 20% Semi-detached, terrace or townhouse 3% Flat, unit, apartment
Time in Current Residence	37% - 1 -10 years 15% - 10 - 20 years 41% - 20+ years
Individual Gross Weekly Income	16% - $200 - $399 18% - $600 - $799 16% - $800 - $999

Knowledge of urban water systems

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

- 63% Waterway (correct)
- 36% Sewerage

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

Water From:	% Responses	
Driveways, footpaths	74%	Correct
Rainwater from the roof	62%	Correct
Other paved areas	49%	Correct
Water from the garden	41%	Correct
The washing machine	17%	Incorrect
The kitchen sink	17%	Incorrect
The shower	15%	Incorrect
The toilet	13%	Incorrect

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

- 79% underestimated daily household water use
- 11% chose the correct range (400-500L per day)
- 11% overestimated daily household water use

Behaviour

Of 104 people who responded to the survey:

1. Rainwater Tanks

- 31 people answered the question about how they use water from their rainwater tank

- 100% use it for garden; 52% for washing the car and 39% for flushing the toilet

2. Greywater Systems

No households had a greywater diversion or treatment system installed, however, 46 people indicated that they currently collect and reuse greywater using other means.

- 96% households use greywater collected on garden and 48% for toilet flushing

3. Water Saving Devices

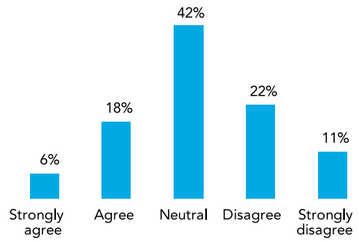
- 86% (89 people) have water saving devices such as water saving showerheads, tap aerators and toilet flush water savers

4. Receptivity to using rain and greywater

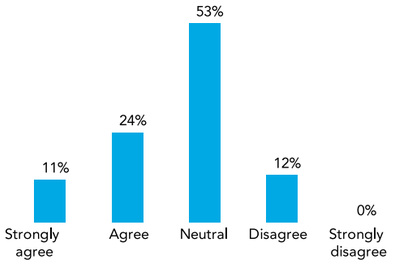
The percentage of people who would consider using rainwater and greywater (water from the shower, bath or hand basins) and how they would use it is shown below:

	Rainwater	Grey Water
Watering Garden	91%	69%
Washing Car	78%	62%
Flushing Toilet	56%	40%
Washing Clothes	33%	4%
Showering	3%	n/a
Would not use	5%	9%

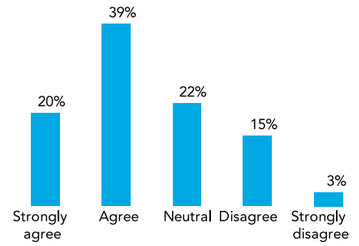
Attitudes



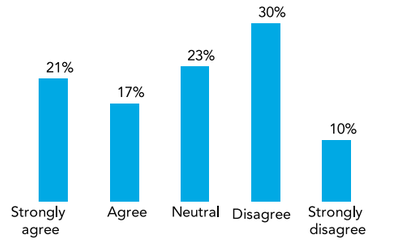
a) 'Jobs are more important than the environment'



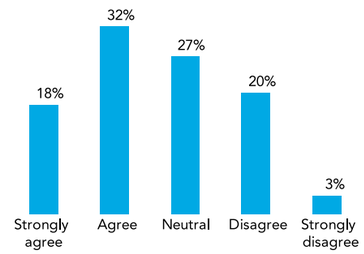
b) 'Access to a healthy natural environment is more important than access to community facilities'



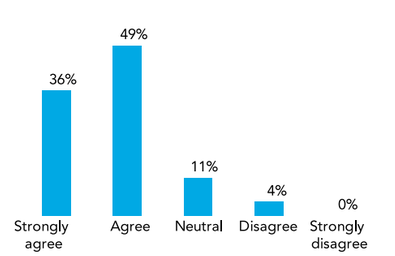
c) 'My daily activities have little negative impact on the waterway environment'



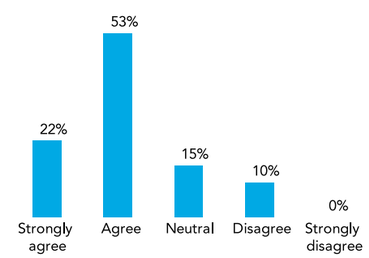
d) 'Government agencies should have the main responsibility for the waterway environment rather than the individual.'



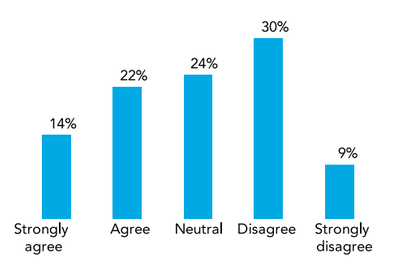
e) 'We should aim for the same waterway conditions as before the Europeans arrived over 200 years ago.'



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.'

Authorities, land users and community groups

Bankstown City Council

Bankstown City Council manages the local roads and parks, including playgrounds, bushland areas and open space within the Subcatchment. Council is also responsible for implementing planning controls and services such as waste collection.

Commercial and Industrial Land Users

There is a range of commercial operators within the Subcatchment consisting largely of automotive related business and other heavy industries such as waste recycling, paper manufacture and news printing. These operations employ around 8,100 staff area which represents 12% of the City's total employment.

In the Chullora Technology Park area, the predominant uses are manufacturing (including food) 33%, transport postal & warehousing 17% and information/media 10%. Major land users include Fairfax Printer, Nationwide News, Pacific National Rail, PaperlinX, TNT Express, United Group Rail Fleet, Tip Top Bakery, McWilliams Wines, Volvo Truck Australia, Primo Smallgoods, WSN Environmental Solutions, TAFE NSW Chullora and Norske Skog.

Housing NSW and community housing organisations

Provide affordable housing options. 8% of the dwellings in the Rookwood Road Subcatchment are rented or owned by the Department of Housing or organisations such as Affordable Community Housing.

Landcom

Landcom is working in partnership with Sydney Water to redevelop 40 hectares of land at the Potts Hill Reservoir site to include residential housing, parks and a business park (see page 17).

Potts Hill Reservoir

The Potts Hill Reservoir is owned and managed by Sydney Water. It includes two large reservoirs and has supplied Sydney with water for over 100 years.

Railcorp

RailCorp is responsible for the joint management and maintenance of the Chullora Marshalling Yards along with Pacific National Rail.

Roads and Traffic Authority

RTA is responsible for the management and maintenance of the major roads in the Subcatchment that include the Hume Highway, Rookwood Road/Stacey Street and Brunker Road.

Schools/TAFE

Bankstown North Primary School
TAFE NSW – Chullora Campus

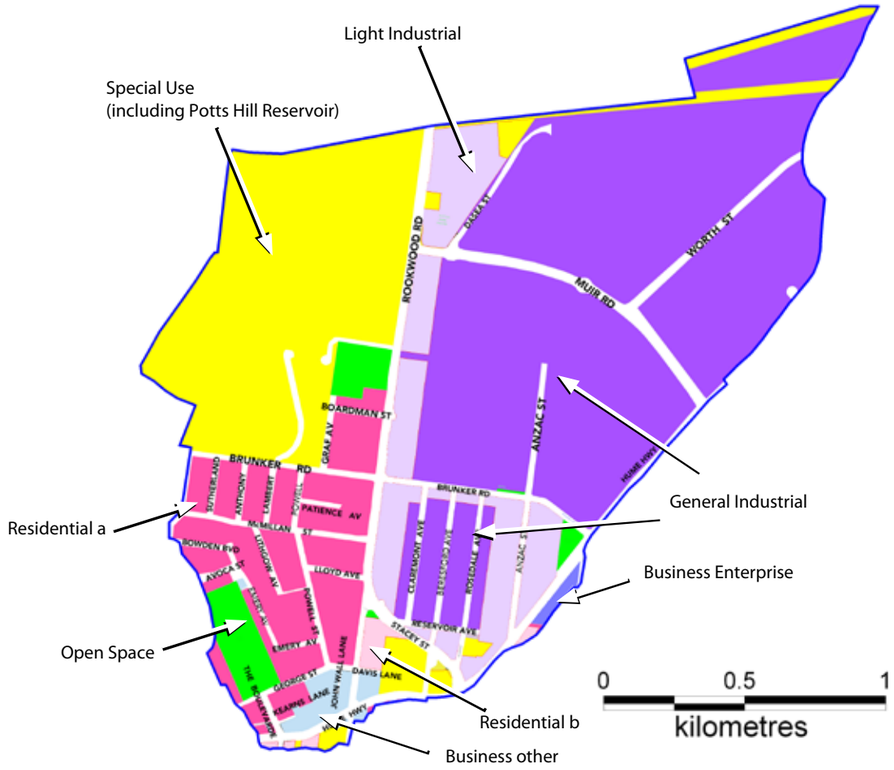
South West Environment Centre Inc.

The South West Environment Centre Inc. is a community group that manage Freshwater Creek Wetlands at Chullora.

Sydney Water

Sydney Water owns and is responsible for the maintenance of the concrete channel that carries the Cooks River as well as the infrastructure associated with the delivery of drinking quality (potable) water and sewage within the Subcatchmen Sydney Water also owns the Liverpool to Ashfield Pipeline which runs just north of the Subcatchment.

Parks, Playgrounds and Reserves	
Freshwater Creek Wetlands	11.7 ha open space and wetlands owned by Sydney Water and managed by Sydney Water and the SouthWest Enviro Group
Graf Park	5.6 ha park including soccer field, cricket pitch and nets, seating and toilets
Potts Park Greyhound Social Club	4 ha park including Greyhound race track, club house and car park
Winsor Park	0.8 ha park includes open space and shady tree areas



Potts Hill - Residential Development

Aerial view of the Rookwood Road Subcatchment today

Proposed Potts Hill Development

Site History

The Potts Hill Reservoir site is located in south-west Sydney and has been used by Sydney Water for more than 100 years. The site is a 116 hectares in total and has a rich heritage. Today, Potts Hill still supplies water to Sydney from two large reservoirs. Sydney Water is working with Landcom to generate options for redeveloping 40 hectares of the site no longer required by Sydney Water.

Proposed Development

Proposed objectives:

- To deliver ecologically sustainable development
- To respond to the needs of the local population
- To integrate with the existing locality, taking account of local transport, services and community facilities
- To respect and respond to the heritage value and natural environment of Potts Hill

Environmental Assessment

Some of the issues addressed include:

- Heritage significance
- Biodiversity, plants and animals
- The appearance of buildings from the surrounding area
- Housing options
- Traffic, access and transport
- Demands on existing infrastructure
- Social impacts including job opportunities and cultural diversity
- Energy and water efficiency
- Construction impacts on the local area

The Environmental Assessment outlines a number of measures to manage potential impacts on the local community and environment. These include:

- Creating well located and diverse open space for the community
- Keeping and restoring vegetation with an overall improvement in biodiversity
- Protecting many rare plant species
- Improving the habitat for native animals
- Keeping and celebrating heritage elements
- A mix of housing options to cater for different family types
- Investigating ways to help contribute towards community services, programs and facilities
- Helping to deal with local traffic issues
- Better access to public transport, new cycle-ways and walking paths

New Housing

The residential area will cover 25 hectares of land and include a variety of housing ranging from single homes to medium density development such as townhouses, seniors housing and small scale apartments. A network of new roads, cycleways and walking paths will connect future and existing residents with local transport, community services and parks.

New Parks

Four areas of open space will be located in the residential area. Brunker Road Park at around 2.8 hectares will be located in the southwest corner of the site. Railway Park, in the north-west corner of the site, near the freight rail line, contains native vegetation and the endangered Downy Wattle. Canal Park is to be located near the water supply canal and Cooper Road Park will be in the centre of the new residential area off Cooper Road.

Business Park

A business park of 15 hectares, will be located on the eastern and southern sides of the site and will be home to a new Sydney Water field headquarters for around 450 staff, most of whom currently work in various locations across the Potts Hill site. The NSW Police is also interested in using part of the business park, as is EnergyAustralia. Transgrid may also develop a new electricity substation there to improve the electricity supply to the metropolitan area.

Reference: Sydney Water & Landcom (2008), Potts Hill Redevelopment proposal Concept Plan Environmental Assessment - summary document, Sydney, Australia.'

What is Water Sensitive Urban Design?

Water Sensitive Urban Design (WSUD) is an approach to managing water in urban areas. Most urban areas have large areas of hard or paved surfaces such as roads, pavements and roofs that prevent water from reaching and soaking into the ground. This means that there is more water running over land than there would be in more “natural” or undeveloped areas (see picture to the right). To deal with the increased amount of overland flow, stormwater has traditionally been directed efficiently into drainage systems to reduce flooding. This approach to urban stormwater has the following effects on natural systems:

- More intense peak flows reach waterways, which can cause erosion of stream banks
- An increase in contaminants including litter, sediments and heavy metals reaching waterways as stormwater transports these substances from the hard surfaces into the nearest waterway

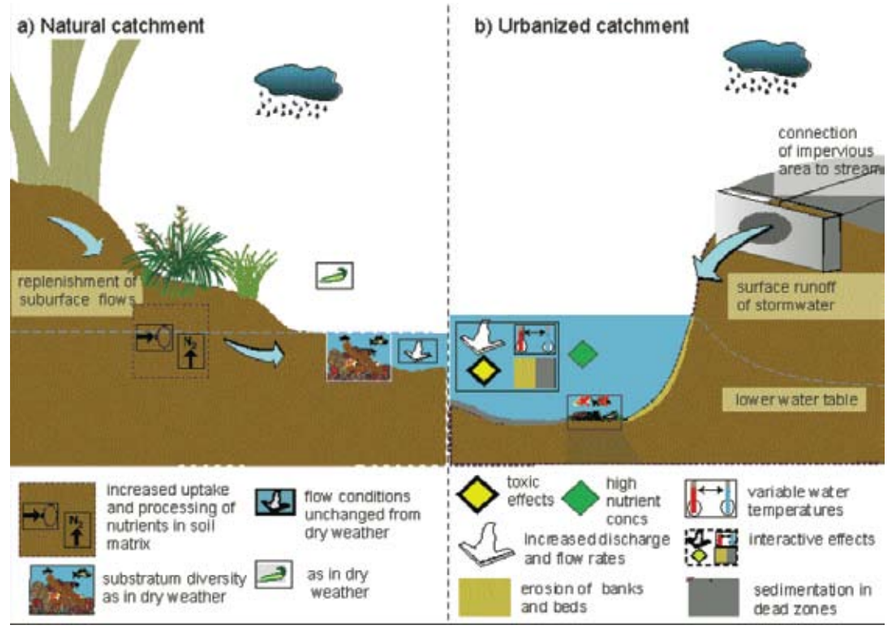
WSUD aims to:

- Maintain or mimic the water cycle that exists in undeveloped or natural areas – that is, to slow the flow of water and to prevent contaminants from reaching waterways
- Reduce the amount of water transported between catchments, this includes reducing:
    1. Water supply imported into a catchment e.g. from a centralized water supply such as Warragamba dam in Sydney
    2. Wastewater that leaves a catchment e.g. sewage being disposed of into the ocean

One way of reducing reliance on water supply from outside a catchment is to make better use of rainwater that falls within the catchment itself - see page 6 to find out how much rainfall falls on Rookwood Road Subcatchment each year.

WSUD aims to:

1. Protect natural systems found in urban areas – this includes creeks, rivers and wetlands
2. Protect water quality by improving the quality of stormwater that runs off urban areas
3. Integrate stormwater treatment into the landscape by using stormwater treatment systems that have multiple uses and benefits such as water quality treatment, wildlife habitat and public open space
4. Reduce the intensity of peak stormwater flows reaching waterways – this can be achieved by temporarily storing water in detention ponds or tanks that gradually release the water over time, and by including more pervious surfaces (surfaces that allow water to reach and soak into the ground)
5. Reduce demand on potable water supply (e.g. Warragamba dam) by using stormwater as a resource through capture and reuse for non-potable purposes such as watering gardens, toilet flushing and industrial use



What is a ‘Catchment’?

A catchment is an area that is bounded by high points such as hills or mountains, from which all run-off water flows to a low point. Many small catchments combine to make up larger catchments e.g. the Rookwood Road Subcatchment is one of many subcatchments that make up the Cooks River Catchment. One way to think of a catchment is to imagine a bathtub from which all water flows into a plug hole.

Reference: Parsons Brinckerhoff, 2005, Water Sensitive Urban Design Guidelines, Parsons Brinckerhoff for Mildura City Council, Victoria, Australia. Image from Walsh C J, Leonard A W, Ladson A R and Fletcher T D (2004) ‘Urban stormwater and the ecology of streams’, Cooperative Research Centre for Freshwater Ecology and Cooperative Research Centre for Catchment Hydrology, Canberra.

Stormwater storage and treatment methods

Rainwater tanks collect rainwater from roofs and hard surfaces. In urban areas, rainwater from tanks is not generally used for drinking, but for watering gardens and flushing toilets.

(www.wsud.org - Carindale Pines, Brisbane, QLD)

Grassed swales or vegetated swales are open gutters covered in grasses and plants to remove sediment and suspended solids. Their efficiency depends on type and height of vegetation.

(www.wsud.org - Model Farms High, Sydney, NSW)

Rain gardens or bioretention systems are devices that slow water down and remove sediments, phosphates, nitrates by passing water through gravel or sand.

(www.wsud.org – Victoria Park, Sydney, NSW)

Buffer strips are strips of vegetation, such as grasses and shrubs, used to absorb road runoff. They remove coarse sediments, such as soil and gravel, from stormwater.

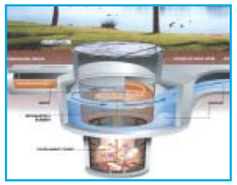
(www.wsud.org - Tempe, NSW)

Wetlands are natural water filtering systems made up of plants such as grasses and reeds. They remove soil, sediments, nutrients, some chemicals and litter from stormwater. Wetlands use a combination of physical, chemical and biological processes to remove pollutants.

Ponds are open bodies of water that settle sediments out of the water. Phytoplankton or other living organisms break down the nutrients and sunlight disinfects the water.

(www.wsud.org – Bicentennial Park Sydney, NSW)

Permeable paving reduces or eliminates stormwater runoff because water is able to go through the surface and into the ground or storage system. It can help reduce pollution and control erosion while assisting property owners to reduce the impervious surface area while still maintaining use of their property for purposes requiring hard surfaces.



Gross pollutant traps remove pollutants such as litter and leaves from stormwater. They are commonly used in urban areas but require high maintenance.

Sedimentation basins are large bodies of open water that remove sediment, soil and litter. Water is held for periods of time while pollution settles out of it.

(www.wsud.org – Conservatorium of Music Sydney, NSW)

Green roofs and walls can be made to suit a variety of building types and a particularly suitable for multi storey flats, units and apartments. They can:

- Increase access to private outdoor green space
- Support urban food production
- Promote individual, community, and cultural diversity
- Improve air quality and reduce carbon dioxide emissions
- Increase habitat
- Insulate buildings
- Increase the value of buildings for owners and tenants alike
- Create jobs in research, design, construction, landscaping / gardening, health, and food production
- Delay stormwater runoff

Freshwater Creek Wetlands

How They Work

Freshwater Creek wetlands provide a way of dealing with stormwater drainage in this area, reducing contaminants and pollutants entering the upper reaches of the Cooks River and reducing downstream flooding.

Wetlands are designed and constructed to utilise the natural processes involving wetland vegetation, soils, and their associated microbial groups to assist in treating urban stormwater run-off. While land intensive, these systems offer an effective means of improved water quality while creating valuable wildlife habitat.

Freshwater Creek is classified as an offline wetland. This is because low flows are diverted from the main stormwater system into the wetland, where water is filtered through the wetland, before returning back into the system. High flows bypass the wetland which reduces potential damage to it and being offline means that the wetland can be totally isolated from incoming flows in the event of a chemical or fuel spill upstream.

References:

Benson, D, Ondinea, D and Bear V (1999) 'Missing Jigsaw Pieces, The Bushplants of the Cooks River Valley', Royal Botanic Gardens, Sydney.

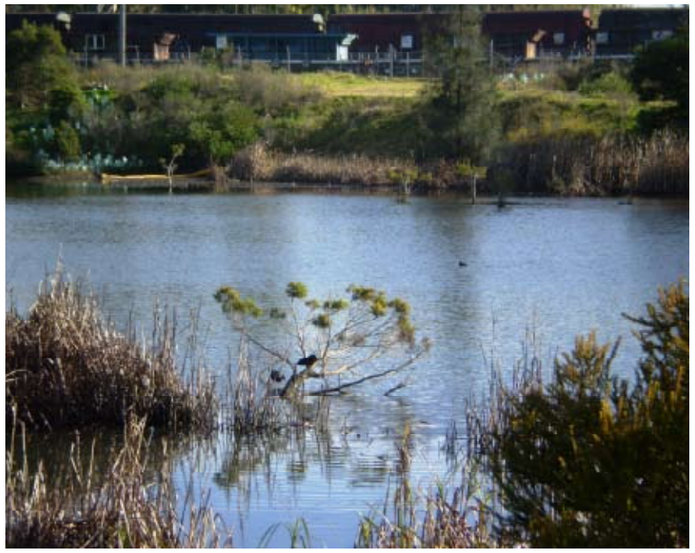
Landcom, 'Chullora Technology Park – Bush Land and Waterways', Parramatta.

Freshwater Creek wetlands are located within Chullora Technology Park close to the head waters of the Cooks River. The wetland system was constructed by Landcom as part of its redevelopment of a neglected and degraded State Rail Authority site.

Landcom worked with the South West Environment Centre Inc (SWEC) and Geoff Sainty (a wetlands expert) to design and help plant out the original wetland. While the 5.8 hectare property is now owned by Sydney Water, SWEC has now become the legal managers of the wetland. SWEC plans to open the site for regular environmental tours and education.

Project Outcomes

- Reduced potential for migration of contaminants to and pollution of Cooks River
- Reduced the potential for pollution of waterways by controlling and treating the stormwater run-off close to its source
- Provided an environmentally and socially responsible alternative to conventional end-of-pipe stormwater treatment systems, where pollution costs are borne by the community
- Optimised treatment levels by managing inflow to the wetland
- Established a natural wildlife habitat by reinstating the endangered native vegetation and rehabilitating the creek bed, providing better amenity for the workers as well as the community



Cooks River Clay Plain Scrub Forest

This endangered ecological community was once common around Chullora but has some become severely impacted by development and the spread of urban and industrial infrastructure. The area around the wetlands have been revegetated with seed gathered on site from representative species of the endangered Cooks River Clay Plain Scrub Forest.

Tireless work over the years by volunteers from the community including the Cooks River Coalition (which became part of SWEC) and the Bankstown Bushland Society have helped to reinstate, maintain and enhance the unique habitat qualities of the site. Close to 100 species of birds have been observed at the site. Other fauna identified at Freshwater Creek wetlands include frogs, reptiles, macro and micro invertebrates.

For more information on the Freshwater Creek wetlands please contact the South West Environment Centre on 9759 0997.