MARRICKVILLE council

WATER3VOLUTION

Funded by the Marrickville community through the Stormwater Charge

Marrickville Council - Waterevolution
Riverside Crescent Subcatchment Management Plan October 2010

Contents

Front cover: Riverside Park, Marrickville, April 1936, looking west to Princess Street. Depression labour is terracing and building roads using material from Council's quarry. Government Printing Office Collection used with permission of State Library of NSW

Riverside Crescent Subcatchment Vision 2050

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In 2050, our Riverside Crescent Subcatchment community is reconnected to the environment and maintains things in a perpetual state of beauty. We are active and healthy with a sense of community pride and take ownership in the care of our environment. We have a secure water supply because we save, store, serve and sustain the subcatchment and all our people understand local water systems.

We acknowledge the work of our previous generations and will, in turn, pass this on to future generations so that our children grow to be proud of the decisions we make.

Our citizens' aspirations are for the community rather than individuals. We actively participate in government by a Cooks River Valley Catchment Council, whose evergreen policies and flexible management ensure plans fit with the bioregion and all development is sensitive to the local environment.

We have a local green economy where everything is valued, nothing is wasted. This is supported by government programmes for recycling, energy and water efficiency. Buildings are water and energy wise, using environmentally sensitive technology.

Our people-friendly streets and roads are clean and there are minimal hard surfaces. Streetscapes, roads and roofs are ecosystems, available for local food production. Stormwater treatment systems are also habitat for frogs, insects and bandicoots. Transport is now completely green, there are few cars, and people mostly walk and cycle.

Our community revolves around shared green spaces that are self-sufficient with water. Parks have wetlands, and forest reservations. We swim in Dibble Avenue Waterhole and the Cooks River waterways that are also habitat for wildlife. The Cooks River and its foreshores are clean, in a natural state, and can be used for recreation and fishing.

Riverside Crescent Subcatchment aerial view, 2007.

Visitors to Dance Around the World at Marrickville West Public School, September 2008.

1.1 Background to subcatchment planning

The *Waterevolution Subcatchment Planning* program is funded by the Marrickville *Stormwater Management Service Charge*. It aims to collaboratively plan each of the 21 subcatchments found in the Marrickville local government area in order to manage water sustainably in this highly urbanised environment.

Collaborative and integrated planning approach

The *Waterevolution* approach to water management by Marrickville Council resulted from the *Urban Stormwater Integrated Management* (USWIM) joint research project of Monash University and Marrickville Council.

Beginning in 2002, the USWIM project worked closely with the community and government stakeholders to integrate water management approaches in Marrickville. This means applying the principles of sustainable water management and best practice governance (see info box this page) that will improve the quality of water runoff into waterways and reduce dependence on drinking quality water brought from outside the catchment. The project trialled a new 'collaborative' planning process (Brown, 2003) that:

1. *Focuses on subcatchments* as appropriately sized areas for planning for integrated sustainable urban water management
2. *Carries out detailed social, biophysical and organisational studies* to have a good understanding of the subcatchment characteristics and the planning context
3. *Includes people from a range of disciplines* in identifying problems and solutions - engineers, social planners, environmental scientists, educators, parks and recreation managers
4. *Involves a wide spectrum of stakeholders* including residents, businesses and other government agencies to come up with visions and plans and help to implement them.

The resulting plans are designed for adaptive management so that they are flexible enough to include new information, practices and technologies as they arise. Importantly, by working with citizens and businesses, this approach encourages planning in the private domain and builds Council and community relationships, recognising that sustainability is a whole of community issue that government cannot address alone. It is beyond Council's capacity to achieve all that is required for sustainable urban water management.

In 2003, Council joined with the Illawarra Road Subcatchment community in Marrickville South and other stakeholders and created Marrickville's first subcatchment management plan in 2006. Council completed the Tennyson Street Subcatchment in Dulwich Hill in 2009. The Riverside Crescent Subcatchment is the third to have a management plan. The subcatchment plans will be reviewed annually to track progress and will have a major review every five years by Council and subcatchment stakeholders, including the subcatchment working groups.

The Waterevolution

The aim of the *Waterevolution* is to work across the local government area (LGA), in both the public and private domain, to implement sustainable urban water management. To achieve this aim, Council is using a multidisciplinary approach, working collaboratively with the people of Marrickville to achieve the following objectives of Stormwater Management:

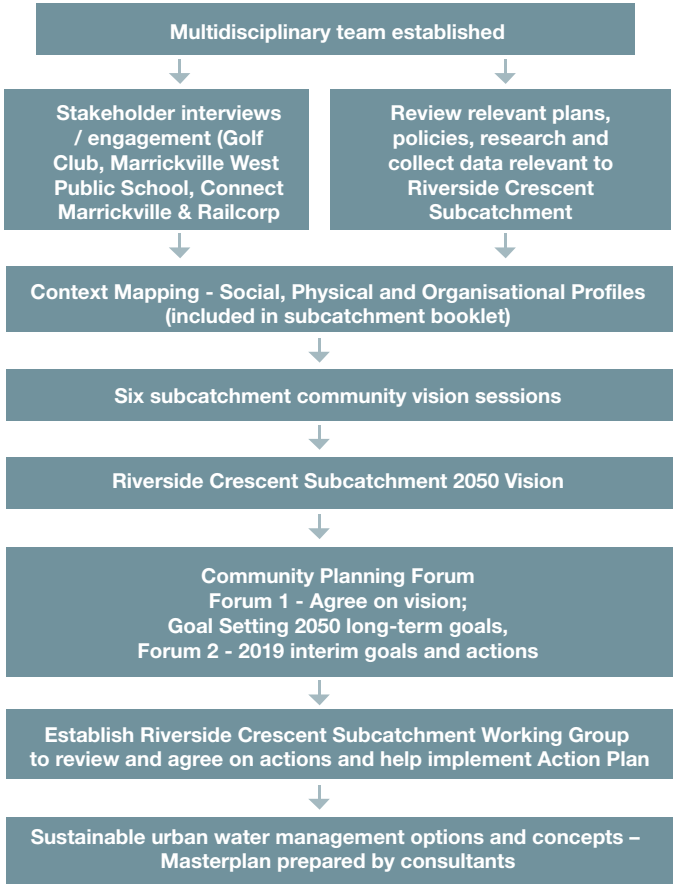
1. Apply the best practice governance to:
    a. work with the people who live and work in the subcatchments;
    b. build the organisational capacity, e.g. skill development, data collection and sharing, evaluation and learning;
    c. integrate projects and planning in order to achieve value for money; and
    d. communicate progress and results to internal and external stakeholders.
2. Apply the principles of sustainable water management to:
    a. improve the quality of stormwater entering receiving waters;
    b. reduce the quantity of stormwater entering receiving waters;
    c. mitigate flooding; and
    d. use water in fit-for-purpose applications, e.g. irrigation.

(From Stormwater Management Service Charge Management Framework, 2008b)

1.2 How we planned Riverside Crescent Subcatchment

Collaborative planning

The goal of collaboration is to partner with the community and other stakeholders in each aspect of decision making, including developing alternatives and identifying preferred solutions. It means actively seeking direct advice and innovation in finding solutions and using the advice and recommendations into the decisions to the maximum extent possible (from IAP2, 2004).



The collaborative planning process in Riverside Crescent Subcatchment (Adapted from Equatica, 2009).

The collaborative planning process (shown left) has produced the Riverside Crescent Subcatchment Management Plan that includes the subcatchment planning context (social, physical, organisational), long-term vision and goals and the actions to achieve the goals.

Multidisciplinary team

The multidisciplinary team of Council staff and consultants mainly included engineers, environmental managers, and social scientists with planners and asset managers involved as required.

Context mapping

Waterevolution Subcatchment Planning is an integrated approach where the plans are tailor-made to suit local conditions. For sustainable water management to be a reality, it is necessary to understand the context of the subcatchment and its community (Brown, 2003; Marsalek, et al 2001).

Context mapping provides all participants with the broad spectrum of relevant information about the subcatchment. It captures the way the subcatchment 'looks' to the local community and sustainable water management team at the time of planning. For Riverside Crescent Subcatchment, the team looked at the subcatchment history, determined the current social, water and other biophysical contexts, as well as the organisations and policies influencing decision making in this area.

With the planning team and subcatchment planning participants having a good common understanding of this context, an environment was created for effective communication and decision making between all disciplines and participants in the planning process.

Stakeholder engagement

Consultants and staff identified the major land managers, water users and decision makers to discuss their participation in the planning and possibilities for on-ground works and non-structural initiatives. In the Riverside Crescent Subcatchment, the Marrickville Golf Club, Marrickville West Public School, Connect Marrickville and RailCorp were involved.

Community vision sessions

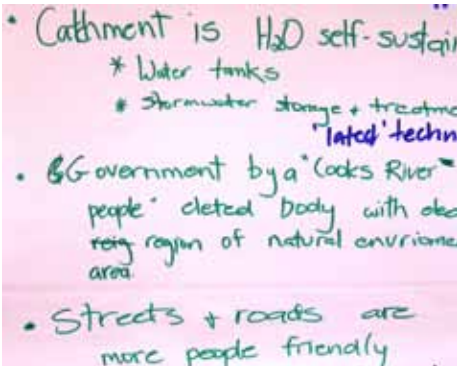
All citizens and businesses in Riverside Crescent Subcatchment were invited to attend visioning sessions in October and November 2008. All participants were provided with the *Planning the Riverside Crescent Subcatchment* booklet (Marrickville Council, 2008a) to ensure all participants had a common understanding of the planning area.

The *Riverside Crescent Subcatchment 2050 Vision* is the result of the ideas from six vision sessions that involved 55 people. Aside from three open sessions, three separate sessions were held with groups of Bangladeshi, culturally and linguistically diverse communities (CALD), and children. Therefore, the vision represents community desires, and forms the main reference point for subcatchment planning.

Riverside Crescent Subcatchment Planning Forum December 2008.

Forum participants came up with draft goals for 2050 and 2019.

Riverside Crescent Subcatchment community vision session October 2008.



Key words and concepts for 2050 from one vision session.

Planning Forum

The community vision formed the basis of the Riverside Crescent Subcatchment Planning Forum held over two evenings in December 2008. The Planning Forum comprised two parts – goal setting and action planning. The forum process provided the opportunity for collaborative development of specific goals to achieve the community vision, as well as potential actions.

Riverside Crescent Subcatchment Working Group

Following the vision sessions and forum, a subcatchment working group of community representatives was established to refine and implement the actions. This Subcatchment Management Plan for Riverside Crescent was finalised in collaboration with the working group.

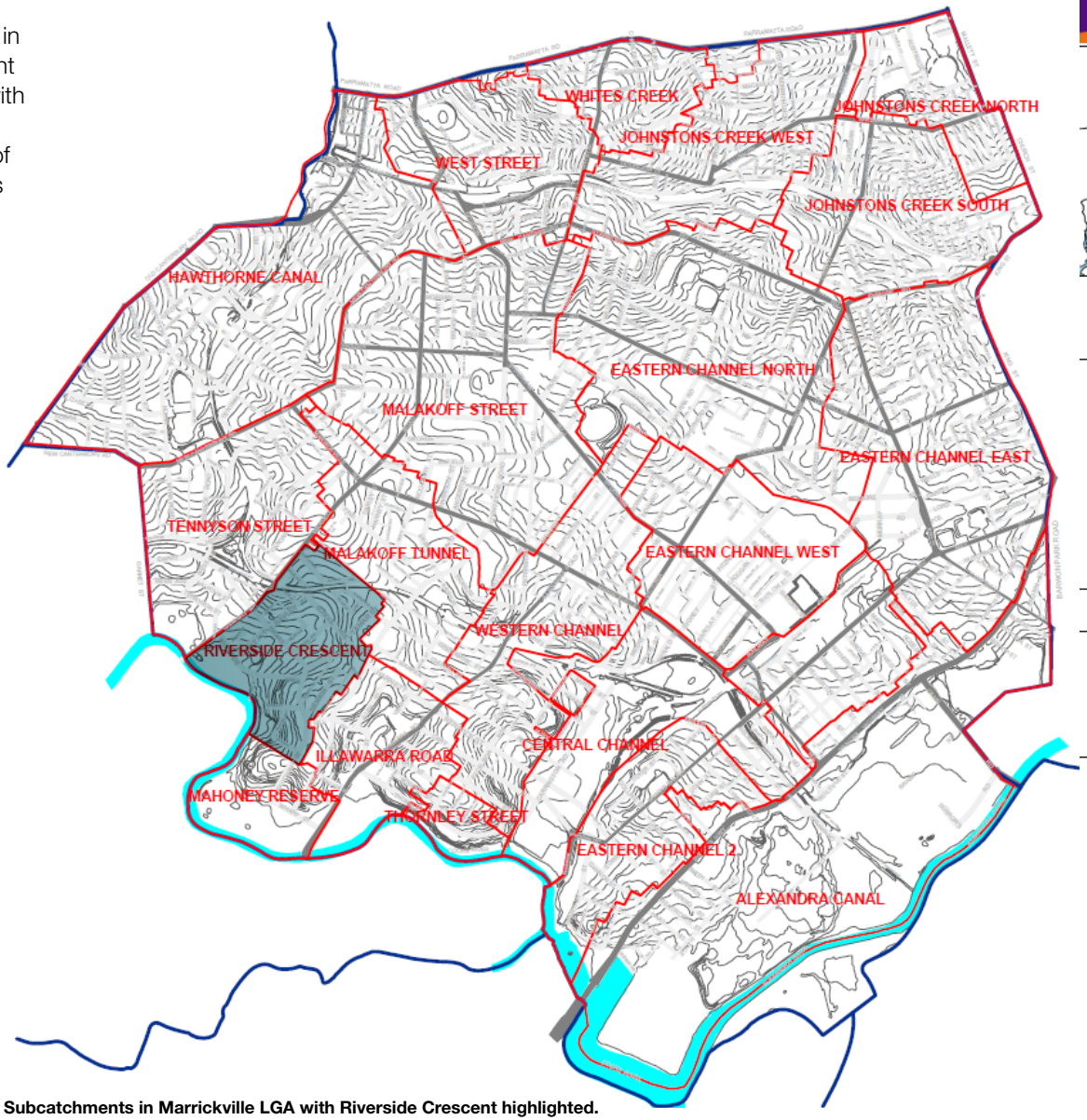
The visioning and planning sessions also gave insight into community receptivity to water reuse and treatment techniques, and raised awareness about sustainable water management. The combining of information compiled during context mapping with local knowledge of water issues, gave a broader understanding of the solutions that will be most appropriate for the community, environment and economy of the subcatchment.

2. About the Riverside Crescent Subcatchment

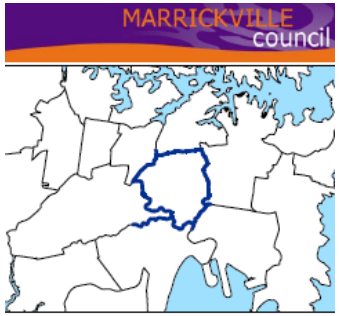
Riverside Crescent Subcatchment is in Marrickville South in the south-western part of the Marrickville local government area, as shown in the map. It drains to the Cooks River with a 700 metre boundary on the River. It is approximately 49 hectares and predominately residential (29ha). A portion of the Marrickville Golf Course (5.6 ha) runs along the Cooks River foreshore.

The Riverside Crescent Subcatchment has a population around 3870 residents, just over 5% of Marrickville's estimated population of 75000 (ABS 2007).

View of the Cooks River from the Marrickville Golf Course.



Subcatchments in Marrickville LGA with Riverside Crescent highlighted.



Subcatchments In Marrickville LGA

0 500 1,000
Metres
Scale 1:20000

Projection: Map Grid of Australia
Datum: GDA 94

PRODUCTION DATE
03/03/2009

LEGEND

- CATCHMENT BOUNDARY
- CONTOURS 2m INTERVALS
- MARRICKVILLE LGA BOUNDARY
- MAJOR ROADS
- ROADS
- RIVER

Riverside Crescent Subcatchment Water Cycle

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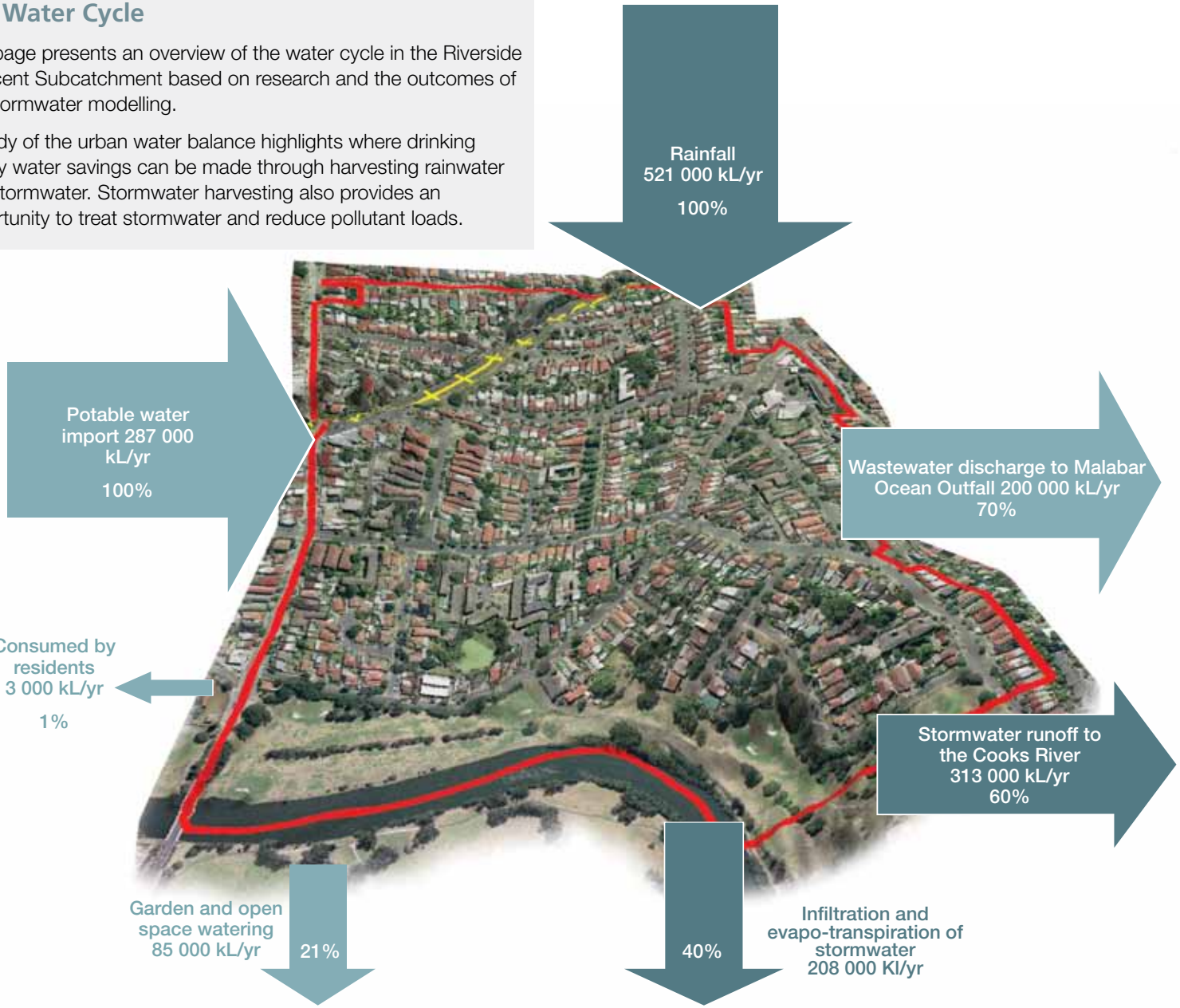
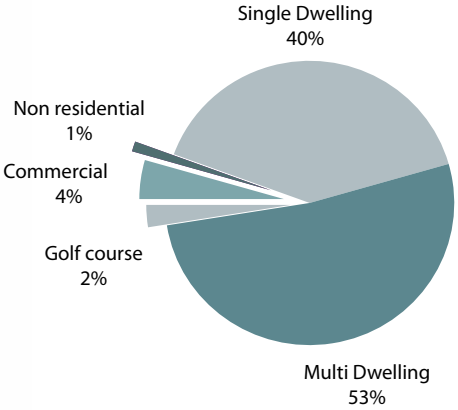
The Water Cycle

This page presents an overview of the water cycle in the Riverside Crescent Subcatchment based on research and the outcomes of the stormwater modelling.

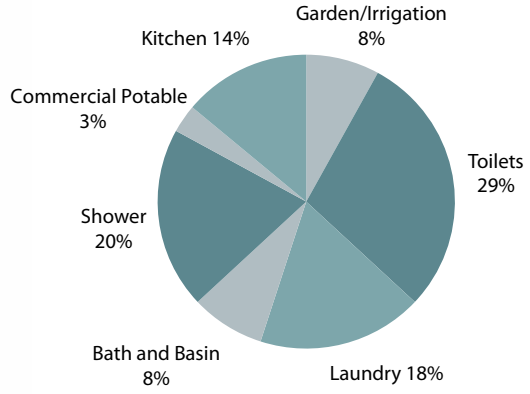
A study of the urban water balance highlights where drinking quality water savings can be made through harvesting rainwater and stormwater. Stormwater harvesting also provides an opportunity to treat stormwater and reduce pollutant loads.



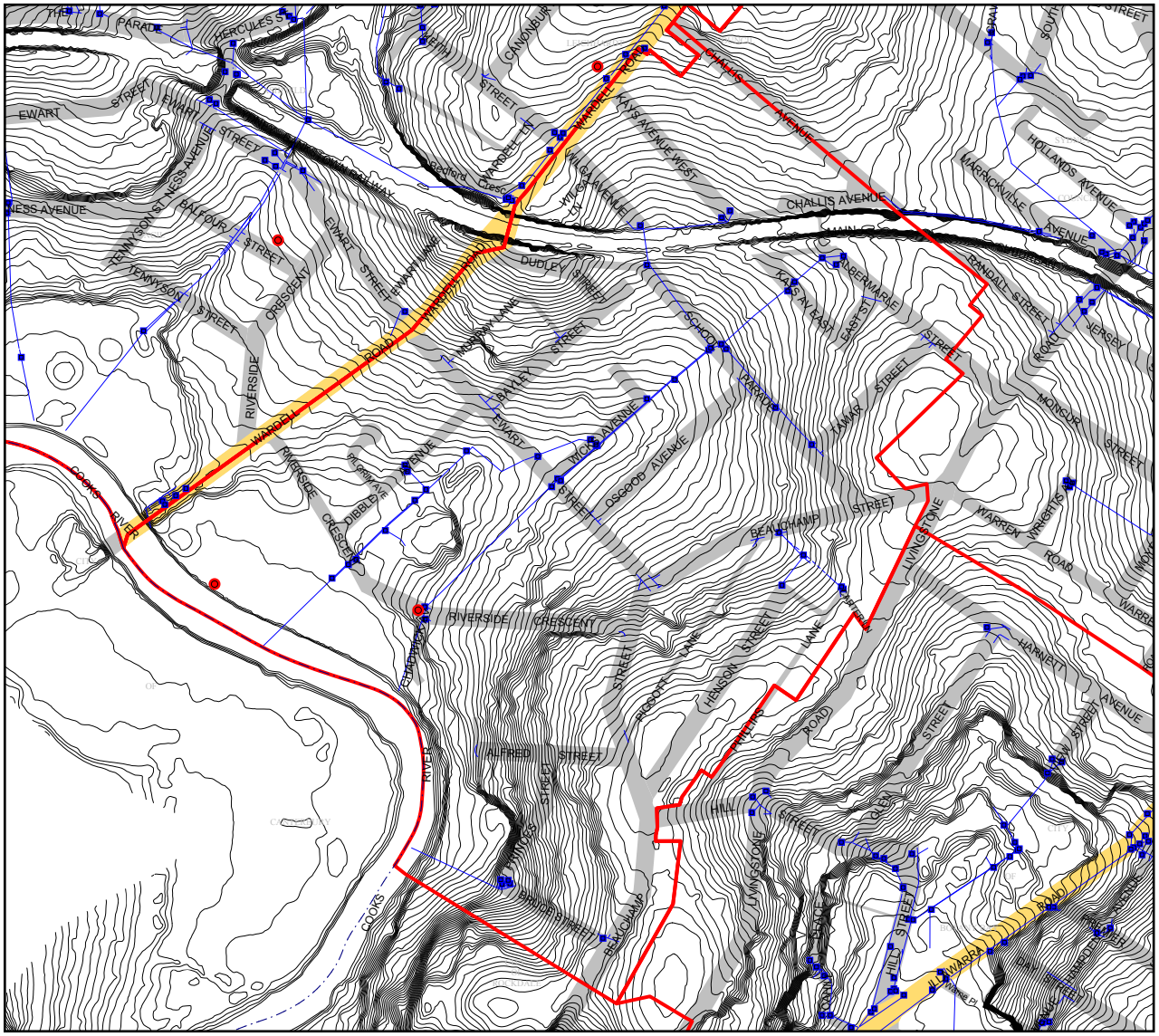
Consumption by Sector



End Use Consumption



Contour Map of Riverside Crescent Subcatchment



The contour map shows the steep gradient of the south eastern area of the Riverside Crescent Subcatchment. There are three primary stormwater drainage paths to the Cooks River. These pathways run along Dibble Avenue, Chadwick Street, and Bruce Street, draining catchment areas of approximately 9 ha, 30 ha and 3 ha, respectively. Locations of gross pollutant traps (GPTs) and the stormwater drainage pits and pipes are also shown.

- Drainage Pits
- GPTs
- Drainage Pipes
- Contour Line
- Riverside Crescent Subcatchment Boundary
- Marrickville LGA Boundary
- Local Roads
- Major Roads

Localised flooding in Ewart Street in downpour in February 2008 (Photo: Annabel Bagot).

Land Use

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Residential Dwelling Types

Subcatchment Size – 48.8 Hectares
Number of residential dwellings – 1,577

43%
Separate Houses

26%
1 or 2 storey block – flat, unit, apartment

20%
3 storey block – flat, unit, apartment

5%
4 storey block – flat, unit, apartment

3%
2 or more storey semi, row, terrace or townhouse

1.5%
1 storey semi, row, terrace or townhouse

* ABS 2006 Census Data

A.B. Crofts Playground 0.08Ha

Dibble Avenue Waterhole 0.25 Ha

Marrickville Golf Course

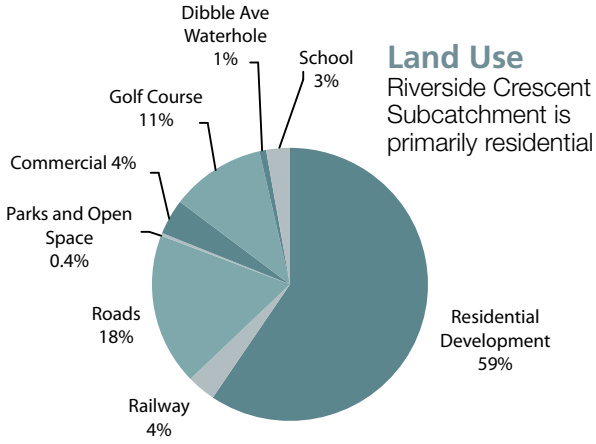
Princes Street Park

Marrickville West Community Garden

Marrickville West Public School

Tom Kenny Reserve

Connect Marrickville 'Schools as Community Centre'



Land Use
Riverside Crescent Subcatchment is primarily residential

Dibble Avenue Watehole Water Cycle

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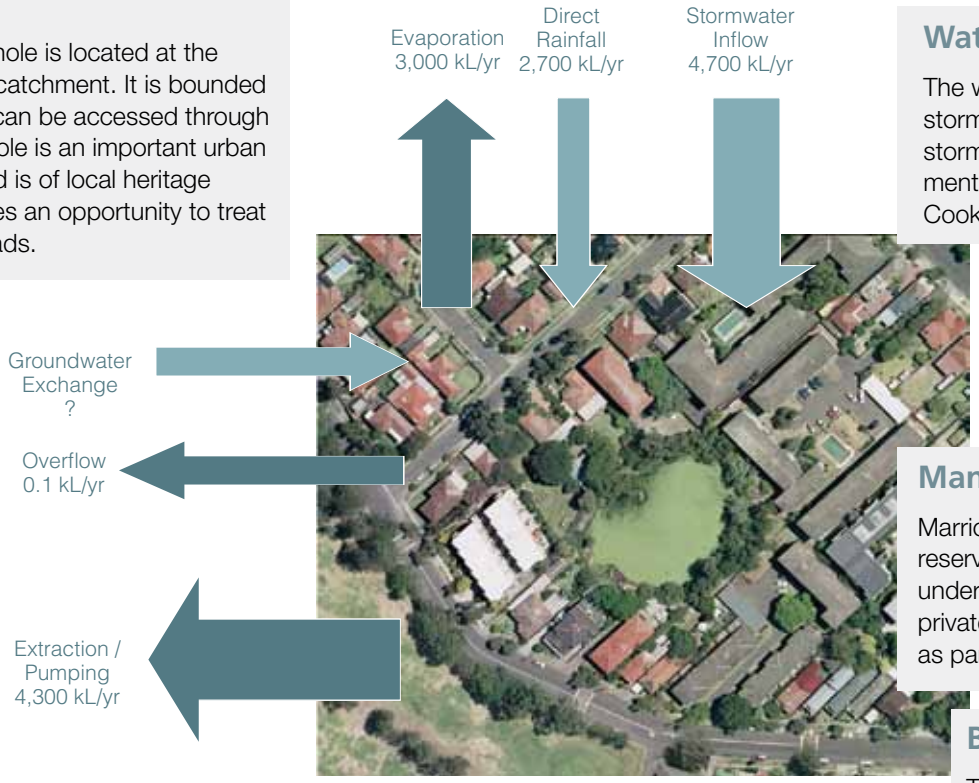
Overview

The 2,500 m^2 Dibble Avenue Waterhole is located at the base of the Riverside Crescent Subcatchment. It is bounded on all sides by private property but can be accessed through A.B. Crofts Playground. The waterhole is an important urban wildlife habitat within Marrickville and is of local heritage significance. Harvesting also provides an opportunity to treat stormwater and reduce pollutant loads.

Dibble Avenue Waterhole, 2005.

A.B. Crofts Playground, 2008.



Water Cycle

The waterhole is fed from direct rainfall, groundwater and stormwater runoff from adjacent properties. It does not receive stormwater runoff from the larger Riverside Crescent Subcatchment. Water overflows from the waterhole through a pipe to the Cooks River. Evaporation and pumping act to lower water levels.

Private property over waterhole, 2008.

Management

Marrickville Council manages Dibble Avenue Waterhole as a public reserve according to a 1997 Plan of Management. Council also undertakes periodic maintenance. Parts of the waterhole are within private property. Marrickville Golf Club extracts water for irrigation as part of a lease agreement with Council.

Biodiversity

The waterhole has served as a refuge for up to 25 species of birds including several important migratory and wetland birds, such as the Eastern Curlew. Chestnut Teals, Dusky Moorhens and Australian White Ibis, have been observed most recently. Long finned eels, dwarf flathead gudgeon and mosquito fish have also been recorded. Council is progressively regenerating the bushland around the waterhole to remove weed species and re-establish indigenous vegetation at the site.

History

The waterhole was formerly a brickpit operated by the Toyer Brothers from 1886 to 1898. After it was abandoned, the pit was gradually filled in to its current average depth of about four metres and fenced off for public safety. Water was first extracted for irrigation of the golf course in 1940. In 1993 a wooden viewing platform was constructed and revegetation undertaken as part of environmental restoration works.

1893 Survey.

Eel Trapping, 1995.

Environmental restoration works, 1993.

Dibble Avenue Waterhole – Issues

Water Quality

Water quality in the waterhole has varied over time. However, testing has frequently shown high levels of nutrients that exceed guideline values. This is thought to have contributed to periodic outbreaks of blue-green algae and weed infestation. There is also a large amount of rubbish in the waterhole, such as car tyres and household goods.

Water Quality - Pollutant concentrations compared to recommended water quality guidelines.

	*Target level (ug/L)	2008 Mean Concentration (ug/L)
Total Phosphorus	10	623
Total Nitrogen	350	7,867
Ammonia	10	7,080
Chromium	1	2
Zinc	8	19

***ANZECC Compliance Value (ug/L)**

Rubbish removed, 2008.

Blue green algae outbreak,1998.

Ibis

In the early to mid 2000s, Australian White Ibis started to form a large nesting colony of around 150—200 birds in the bamboo at the waterhole. The noise and odour from this colony seriously affected the quality of life for surrounding residents. Following Council's adoption of an Ibis Management Plan in 2008, Council has removed bamboo resulting in a decline in ibis numbers.

Ibis roosting in bamboo, 2007.

Duckweed, 2007.

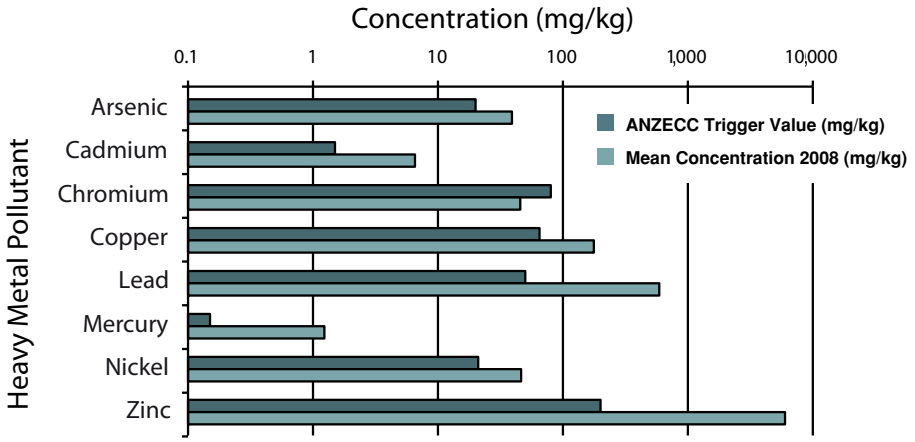
Sediment Quality

Sediments in the waterhole are very 'watery' and easily disturbed. Sediments also contain high concentrations of heavy metals including arsenic, cadmium, copper, mercury, nickel, lead and zinc. These exceed guidelines' values and pose an ecological risk.

	*Guideline Value (mg/kg)	2008 Mean Concentration (mg/kg)
Arsenic	20	39.1
Cadmium	1.5	6.6
Chromium	80	45.6
Copper	65	176.8
Lead	50	590.3
Mercury	0.15	1.2
Nickel	21	46.3
Zinc	200	5991.7

Sediment Quality - Pollutant concentrations compared to recommended sediment quality guidelines.

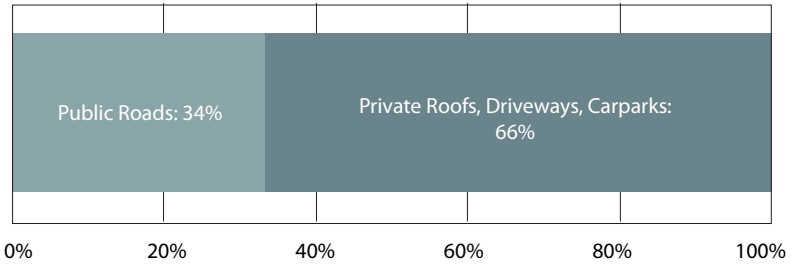
***ANZECC Trigger Value (mg/kg)**



Pollutants and Hard Surfaces

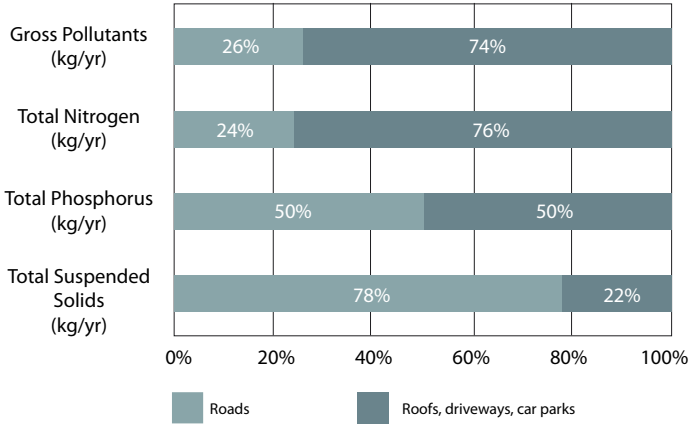
Approximately 60% of the catchment is impervious, reflecting the high density residential character of the subcatchment apart from the golf course. Public roads make up 34% of the hard surfaces, and roofs, driveways and car parks make up the remaining 66%.

Breakdown of Impervious Areas



Water quality modelling determines the relative pollutant contributions from the subcatchment based on a breakdown of the impervious area.

Pollutants from Different Impervious Areas



Cleaning out the CDS unit in Balfour Street that traps some gross pollutants heading for the Cooks River.

Hard surfaces increase the volume and speed of stormwater runoff that carries pollutants to the Cooks River.

Sediment escaping from building sites enters into the stormwater system that discharges to the Cooks River.

Private property contributes significantly to gross pollutant and nitrogen loads due to the large volume of stormwater runoff from these areas. Reducing the flow volume would 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 combines 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.

Hot Spots

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This diagram shows the stormwater issues and hot spots as identified by the community and in interviews with Council staff.

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 Riverside Crescent Subcatchment occurs at:

- Abermarle Street at the railway line
- Kays Avenue
- School Parade west of Osgood Avenue
- Ewart Street west of Wicks Avenue
- Riverside Crescent east of Dibble Avenue

Flooding in Ewart Street, February 2008. (Photos: Annabel Bagot.)

Marrickville Golf Course on the banks of the Cooks River is subject to flooding. Dibble Avenue Waterhole provides an opportunity for stormwater harvesting to irrigate part of the golf course.

Litter is often found in and around the Cooks River along the Golf Course

Dumping

Dumping is regularly a problem at:

- Ewart Steet near corner of Murray Lane
- Bayley Street
- Osgood Avenue
- Henson Street

Various gross pollutant traps (●) are installed in the catchment

- CDS Unit – Riverside Crescent near Chadwick Street
- Net Tech Trap – on the Cooks River at Golf Course

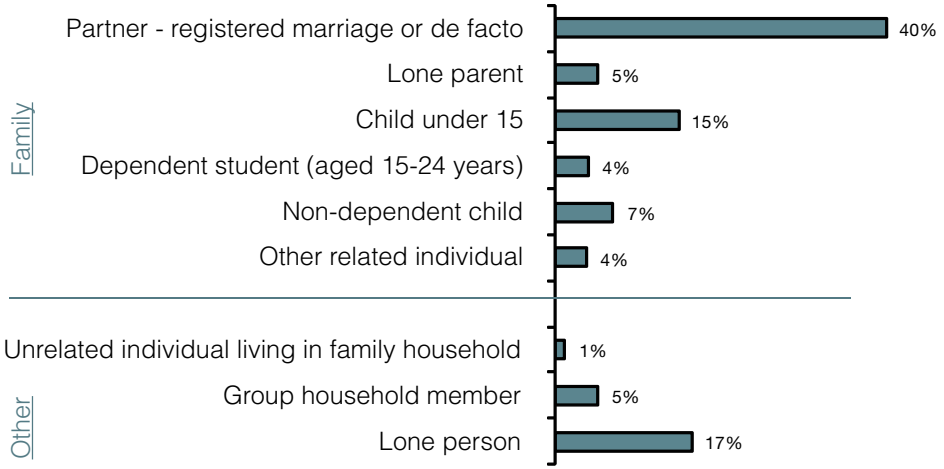
CDS GPT

Social Characteristics

Key Statistics

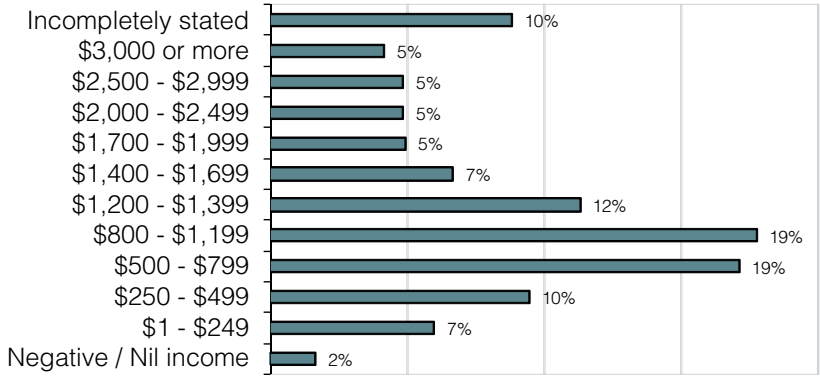
- Population – 3,870 residents
- Origin – 47% born overseas; Greece (6.5%), Vietnam (3.6%), Lebanon (3.3%), UK (2.7%), New Zealand (2.1%), China (2.2%)
- Languages at home – 51% non-English
  Greek (11%), Arabic (8%), Chinese Langauges (6%), Vietnamese (5%)
- Religion – Catholic (28%), Eastern Orthodox (13.2%), Islam (6.9%), Anglican (6.7%), Buddhist (6.1%)
- Travel to work – Car (54%), Train (32%), Bus (11%), Walk (3%)

Household Types



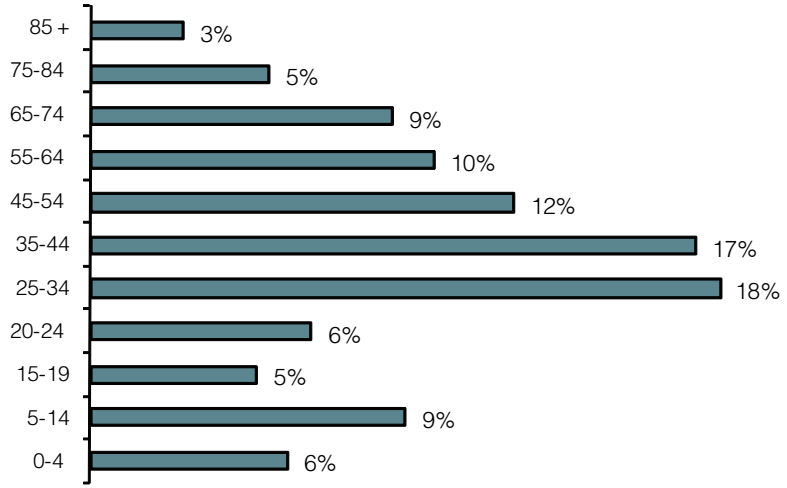
Household types – family 80%, other 20%

Weekly Household Income



Household income
- almost 57% of households have income below the Marrickville median of $1,160 per week.
- 15% have income above $2,000 per week.

Age Distribution



All data from ABS 2006 Census. Please note, all percentages are rounded.

Education

- Educational attendance - 33% (1,258 people)
  – Preschool 3%, Infant / Primary 17%, Secondary 15%, Technical or Further Education Institution 10%, University or other Tertiary Institution 17%, Institution not stated 33%
- Non-School Qualifications (over 15 years)

– None 65%, University 20%, Other 14%

Employment

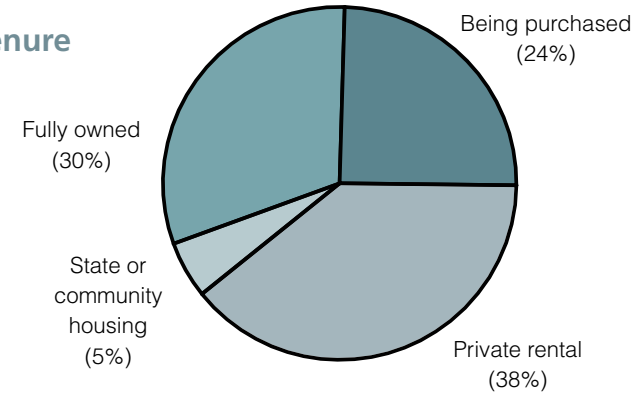
Of the total labour force (2,470 people):

- Full-time – 63%
- Part-time – 26%
- Unemployed – 11%

Residency Time

- 84% lived at the same address 1 year ago
- 58% lived at the same address 5 years ago

Household Tenure



Citizen Action

The implemention of the Riverside Crescent Subcatchment Management Plan can only happen if citizens make practical changes on their properties.

Community Depaving

The idea of “depaving” is gathering momentum in the USA, especially in Portland, Chicago and Berkeley. With the permission of a landowner, paved areas are removed and replaced with vegetated areas. In Portland, a community organisation called Depave.org has led depaving projects in private backyards, school yards and parking lots. These images are from some of their projects:

Volunteers remove pavement from a corner lot at North Williams Ave and NE Fargo Street in North Portland, USA.

A back yard in Portland, before and after depaving
(All information and photos taken from Equatica, 2009).

Riverside Crescent Community Water Survey

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Who answered the survey?

(Total: 211 people)

Gender	59% Females 41% Males
Origin	34% born in Aust. 8% East/SE Asia 8% Western Europe
Language	18% Non-English speaking at home
Education	59% University educated incl. postgraduate 20% School only
Age	25% 30-39 years 24% 40-49 year 23% 50-59
Household Type	33% Couple with children 32% Single living alone 18% Couple no children
Tenure Type	45% Fully own home 28% Buying home 23% Private Rental
Dwelling	50% Flat, Unit, Apartment 38% Separate House 12% Semi, Terrace, Townhouse
Time in Current Residence	31% 1-5 years 21% 6-10 years 12% 11-15 years
Individual Gross Weekly Income	17% >$1500 19% $1000-$1499 13% $600-$799

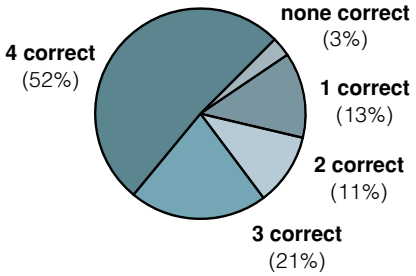
Knowledge of urban water systems

1. In Marrickville, the rainwater in the street drains normally goes to:

- 78% Waterway (correct answer)
- 14% Sewerage system
- 2% Sea

2. Water from which of the following would normally end up in the street drains?

- kitchen sink
- driveways / footpaths
- toilets
- excess water from the garden
- the washing machine
- shower
- other paved areas
- rainwater from the roof



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

- 76% underestimate
- 14% correct range (400-500L)
- 9% overestimate

Behaviour

Of 211 people:

1. Rainwater Tanks

- 10% (21 people) have a rainwater tank, 34% (7) of these are smaller than 2,000L
- 100% use for garden; 24% (5) for washing clothes

2. Greywater Systems

- 8.5% (18 people) have a greywater system
- 100% use for garden, 17% (3 people) toilet

3. Water Saving Devices

- 80% (169 people) have water saving devices

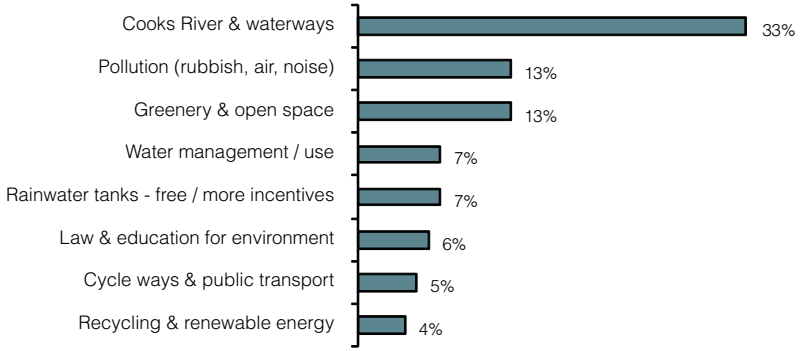
Receptivity to using rain and recycled water

The percentage (%) of people who would consider using rain and recycled water

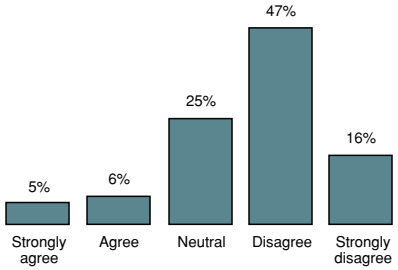
	Filtered Rainwater	Treated Recycled Water
Cooking	31%	11%
Drinking	24%	10%
Showering	54%	23%
Washing Clothes	69%	47%
Flushing Toilet	84%	83%
Washing Car	84%	80%
Watering Garden	86%	83%
Nothing	11%	9%

Future Riverside Environments

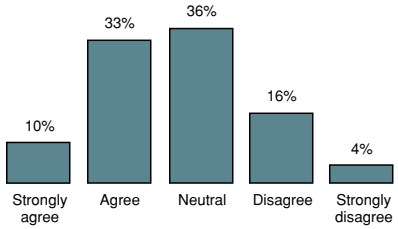
Major improvements wanted in the next 20 years



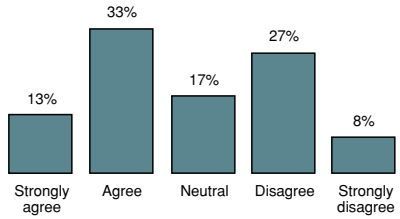
Attitudes to the Waterway Environment



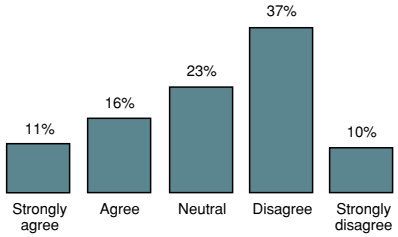
a) 'Jobs are more important than the environment'



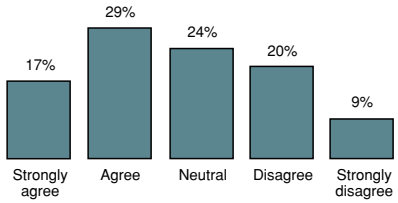
b) 'Access to a healthy natural environment is more important than access to community facilities'



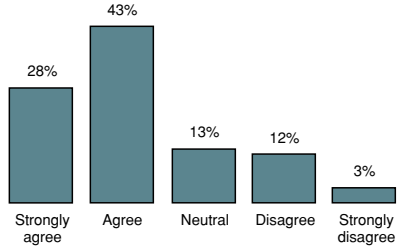
c) 'My daily activities have little negative impact on the waterway environment'



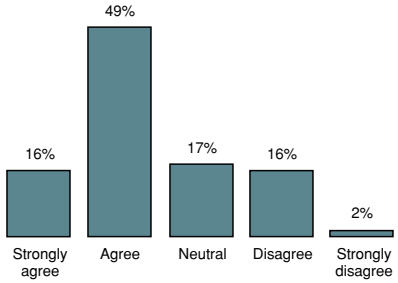
d) 'Government agencies should have the main responsibility for the waterway environment rather than the individual.'



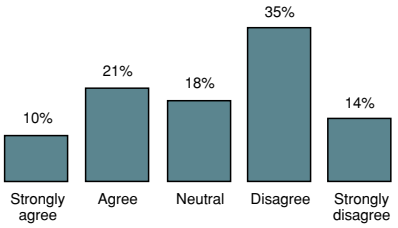
e) 'We should aim for the same waterway conditions as before the Europeans arrived over 200 years ago.'



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

Sydney Water

Controls wastewater and potable water infrastructure and delivery within the subcatchment.

Railcorp

Owns and manages the Bankstown Railway Line and adjacent rail corridor.

Maritime NSW

Consent Authority for water-based developments on the Cooks River. Responsible for the River below high tide, managing moorings and major aquatic events.

Departments

Housing NSW

Provides affordable housing for low-income families in 4% of dwellings in the subcatchment.

Department of Department of Environment, Climate Change and Water

Provides funding and regulates Sydney Water and RTA to make sure their activities do not negatively affect the environment.

The NSW Office of Water

Coordinates the development of metropolitan water policy and planning; responsible for surface water and groundwater management, water licensing and compliance, and implementation of major water infrastructure projects.

Parks, Playgrounds & Reserves

All parks and reserves managed by Marrickville Council's Parks and Reserves Section.	
Marrickville Golf Course	21.5 ha. Leased from Marrickville Council
A. B. Crofts	0.08 Ha pocket park with seats and a bubbler.
Dibble Ave Waterhole	0.25 Ha fenced off water storage pond behind the A. B. Crofts Playground area
Princess Street Park	Pocket park with seating and shaded area. Nature area adjacent to Marrickville Golf Course.
Tom Kenny Reserve	Pocket park with playground equipment and seating.

This diagram represents the range of authorities and major landusers in the catchment.

Land Users

Schools

- Marrickville West Public School – Livingstone Road, 263 students. Owns nearby community garden land.
- St Maroun's Primary and High School - 192 Wardell Road, 650 students (just outside subcatchment area).
- Casimir Catholic College - 200 Livingstone Road, Marrickville (just outside subcatchment area). 687 students (2007), Years 7-12 College.

Community Services

Organisation/ Operation	Activities/Management	Location
Marrickville West Community Garden	Members grow organic vegetables, herbs and flowers in individual and communal plots	1 / 7 Henson Street, Marrickville 2204 (Marrickville West Public School grounds)
Connect Marrickville	A "Schools as Communities Centre" to support families raising young children from birth to 8 years in the Marrickville South area.	Marrickville West Public School

Commercial

There are fewer than 10 commercial businesses in Riverside Crescent Subcatchment, concentrated in Wardell Road, Dulwich Hill.

Urban Development

Marrickville Urban Strategy

In April 2007, Marrickville Council adopted *The Marrickville Urban Strategy* that provides the planning context for future development across the Marrickville local government area. The strategy is also available online at: http://www.marrickville.nsw.gov.au/council/plans/marrickvilleurbanstrategy.htm

Dulwich Hill Station -

Character

Small neighbourhood business centre on the north side of Dulwich Hill Station.

Generally good quality public domain, with surrounding tree-lined streets.

Adjacent residential area contains predominantly single storey detached dwellings.

Access to Dulwich Hill station and bus services.

Close to the Cooks River and Golf Club.

Opportunities

Key location along The GreenWay from the Cooks River to Hawthorne Canal.

Provide incentives for increased investment in retail and services.

Potential for increased dwellings.

Focus for renewal.

Dulwich Hill Shops, New Canterbury Road.

3. Riverside Crescent Subcatchment Vision, Goals and Action Plan

3.1 Riverside Crescent Subcatchment Vision and Goals

The Riverside Crescent Subcatchment 2050 Vision was created by the subcatchment community at a series of planning sessions in late 2008. The community goals set out clear aims for the Cooks River and the subcatchment for the year 2050, as well as interim goals for 2019.

The Riverside Crescent Subcatchment Vision for 2050

In 2050, our Riverside Crescent Subcatchment community is reconnected to the environment and maintains things in a perpetual state of beauty. We are active and healthy with a sense of community pride and take ownership in the care of our environment. We have a secure water supply because we save, store, serve and sustain the subcatchment and all our people understand local water systems.

We acknowledge the work of our previous generations and will, in turn, pass this on to future generations so that our children grow to be proud of the decisions we make.

Our citizens' aspirations are for the community rather than individuals. We actively participate in government by a Cooks River Valley Catchment Council, whose evergreen policies and flexible management ensure plans fit with the bioregion and all development is sensitive to the local environment.

We have a local green economy where everything is valued, nothing is wasted. This is supported by government programmes for recycling, energy and water efficiency. Buildings are water and energy wise, using environmentally sensitive technology.

Our people-friendly streets and roads are clean and there are minimal hard surfaces. Streetscapes, roads and roofs are ecosystems, available for local food production. Stormwater treatment systems are also habitat for frogs, insects and bandicoots. Transport is now completely green, there are few cars, and people mostly walk and cycle.

Our community revolves around shared green spaces that are self-sufficient with water. Parks have wetlands, and forest reservations. We swim in Dibble Avenue Waterhole and the Cooks River waterways that are also habitat for wildlife. The Cooks River and its foreshores are clean, in a natural state, and can be used for recreation and fishing.

3.2 Riverside Crescent Subcatchment 2050 Goals

In 2050:

1. The community supports the Riverside Crescent Subcatchment Vision.
2. The Cooks River people are connected to the land.
3. The Cooks River Valley Bioregional Council is well established.
4. Every street in the subcatchment is a sustainable street.
5. Water and energy supplies for buildings and open space are diverse and sustainable.
6. Only 30% of the rainwater runs off the subcatchment into waterways.
7. Open space meets the needs of community, wildlife and water systems.
8. We can swim and play in the waterways.

Pelicans on the Cooks River.

Peregrine Falcon photographed in the Marrickville LGA in 2008

3.3 Riverside Crescent Subcatchment 2019 Goals

1. The Riverside Crescent community:
    a. identifies with the subcatchment; and
    b. understands the water cycle and takes ownership.
2. The Riverside Crescent Subcatchment Working Group is representative of the diverse community.
3. The diverse stories have been developed and are known.
4. A memorandum of understanding has been drafted by a coalition of stakeholders to implement the Cooks River Valley bioregional structure for governance of the Valley.
5. Everyone in the Riverside Crescent Subcatchment knows what a sustainable street is.
6. Water sensitive urban design is applied to all Council activities.
7. Only 40% of stormwater from the subcatchment reaches the Cooks River.
8. Open space on the Marrickville Golf Course is managed for water and biodiversity that enhances recreation and ecological values.
9. All options for fit-for-purpose water use in the subcatchment have been identified and modelled.
10. Infrastructure in the subcatchment has changed so that:
    a. 50% of streets and buildings incorporate infrastructure to collect, treat, store and use non-potable water;
    b. 100% of households have some type of water conservation/reuse system installed; and
    c. 25% (400) homes use renewable energy technology.
11. Rain gardens, swales and other WSUD systems are installed in more than 50% of the identified priority sites.

3.4 Riverside Crescent Subcatchment Action Plan

Role of Actions

The subcatchment actions aim to meet multiple goals. In addition to water management goals (water conservation, wastewater minimisation, water quality and drainage/flooding issues), Riverside Crescent Subcatchment citizens are interested in actions that also address broader sustainability concerns, e.g. climate change, energy, sustainable transport, biodiversity, community involvement and good governance. The management plan for the subcatchment is therefore focused on meeting the community's goals, and addressing other sustainability goals wherever possible.

The Riverside Crescent Subcatchment Action Plan is a working document that will be regularly reviewed by Council and the Riverside Crescent Subcatchment Working Group.

Changing Streets for Multiple Goals

Wide streets could be redesigned to include a central median swale when they are resurfaced.

Wide streets could also be redesigned by extending the nature strip on either side and narrowing the paved area. In this street, this would bring the street trees within the nature strip.

A vegetated garden bed within the streetscape could be designed as a passive irrigation or bioretention system. (Photos and text, Equatica, 2009)

Riverside Crescent Subcatchment Action Plan – achieving the 2019 Goals

Goal 1

1. The Riverside Crescent community:

a. identifies with the subcatchment; and

b. understands the water cycle and takes ownership.

Actions

1. Council, community and stakeholders:
   a. develop and implement a comprehensive water campaign on Riverside Crescent Subcatchment, that includes a Riverside Crescent sustainable street information session; and
   b. work to make 85% of households receptive to using rain and recycled water for gardens, car washing, toilet flushing, hot water systems, and washing machines/clothes.
2. Establish a community working party to organise a regular event in the subcatchment.
3. Update social and physical profile every 5 years:
   a. community water survey including follow up research (focus groups); and
   b. model water cycle/ budget.

Goal 2

The Riverside Crescent Subcatchment Working Group is representative of the diverse community.

Actions

4. Promote working group through Council committees and organisations working with local communities.

Goal 3

The diverse stories have been developed and are known.

Actions

5. Establish a community working group to document and record local stories.

***Riverworks*, the Cooks River Environmental Sculpture Competition on display at the 2007 Cooks River Festival.**

Goal 4

A memorandum of understanding has been drafted by a coalition of stakeholders to implement the Cooks River Valley bioregional structure for governance of the Valley.

Actions

6. Determine relevant stakeholders to:
   a. agree on leaders / lead agencies and their roles and responsibilities;
   b. research bioregional governance structures; and
   c. draft memorandum of understanding.

Goal 5

Everyone in the Riverside Crescent Subcatchment knows what a sustainable street is.

Actions

7. Work with community and stakeholders to develop and implement a campaign on 'sustainable streets' to coincide with Action 1a.
8. Determine funding support for a sustainable street.

Riverside Crescent Subcatchment Action Plan – achieving the 2019 Goals

Goal 6

Water sensitive urban design is applied to all Council activities.

Actions

9. Increase the skills and capacity of Council staff and contractors to implement best practice integrated sustainable urban water management.
10. Require skills in sustainability in job descriptions for key Council positions.
11. Involve Council's Integrated Urban Water Management Group in the implementation of Council's current Asset Management Strategy and Plans.
12. Ensure 2050 Subcatchment Management Plan goals inform capital works and maintenance programs.

Goal 7

Only 40% of stormwater from the subcatchment reaches the Cooks River.

Actions

13. Ensure DCP requires all new developments to use WSUD to:
    a. reduce impervious surfaces; and
    b. measure and treat stormwater.
14. Model pollutant loads in the subcatchment water cycle every 5 years (see Action 3b).

Goal 8

Open space is managed for water and biodiversity that enhances recreation and ecological values.

Actions

15. Involve the community in the discussion about the future use of the golf course.
16. Work with subcatchment stakeholders to review, prioritise, promote, and seek funding for the design and construction of on-ground options proposed for:
    a. Marrickville golf course near Bruce St - bioretention system to treat Bruce St stormwater drain flows;
    b. The Marrickville golf course near Dibble Ave - gross pollutant trap (GPT) and constructed wetland;
    c. School Parade - street and verge bioretention systems;
    d. Henson St - bioretention system within school playground;
    e. Kays Ave west - Bioretention system;
    f. Albermarle St - street and verge bioretention systems; and
    g. Beauchamp St - verge bioretention system.

Goal 9

All options for 'fit-for-purpose' water use in the subcatchment have been identified and modelled.

Actions

17. Identify the easy to implement fit-for-purpose options in the subcatchment public domain, including Dibble Avenue Waterhole:
    a. Cost them;
    b. Report back / present to the Riverside Crescent Subcatchment Working Group;
    c. Prioritise them; and
    d. Identify and seek funding opportunities.

A part of the Marrickville Golf Course running along the Cooks River in the Riverside Crescent Subcatchment.

Riverside Crescent Subcatchment Action Plan – achieving the 2019 Goals

Goal 10

10. Infrastructure in the subcatchment has changed so that:

a. 50% of streets and buildings incorporate infrastructure to collect, treat, store and use non-potable water;

b. 100% of households have some type of water conservation/reuse system installed; and

c. 25% (400) homes use renewable energy technology.

Actions

Also see Actions 1, 7, 13 and 17

18. Identify priority sites for WSUD in Riverside Crescent Subcatchment, then:
    a. Seek funding; and
    b. Implement construction.
19. Identify and promote Sustainability Ambassadors in the subcatchment.
20. Establish a community working group to develop and implement a campaign on renewable energy technology to coincide with Action 1, then:
    a. seek partnerships - commercial, government, research and financial sector; and
    b. provide a menu of energy options – demonstration homes, including multi-unit dwellings in collaboration with Housing NSW.

Goal 11

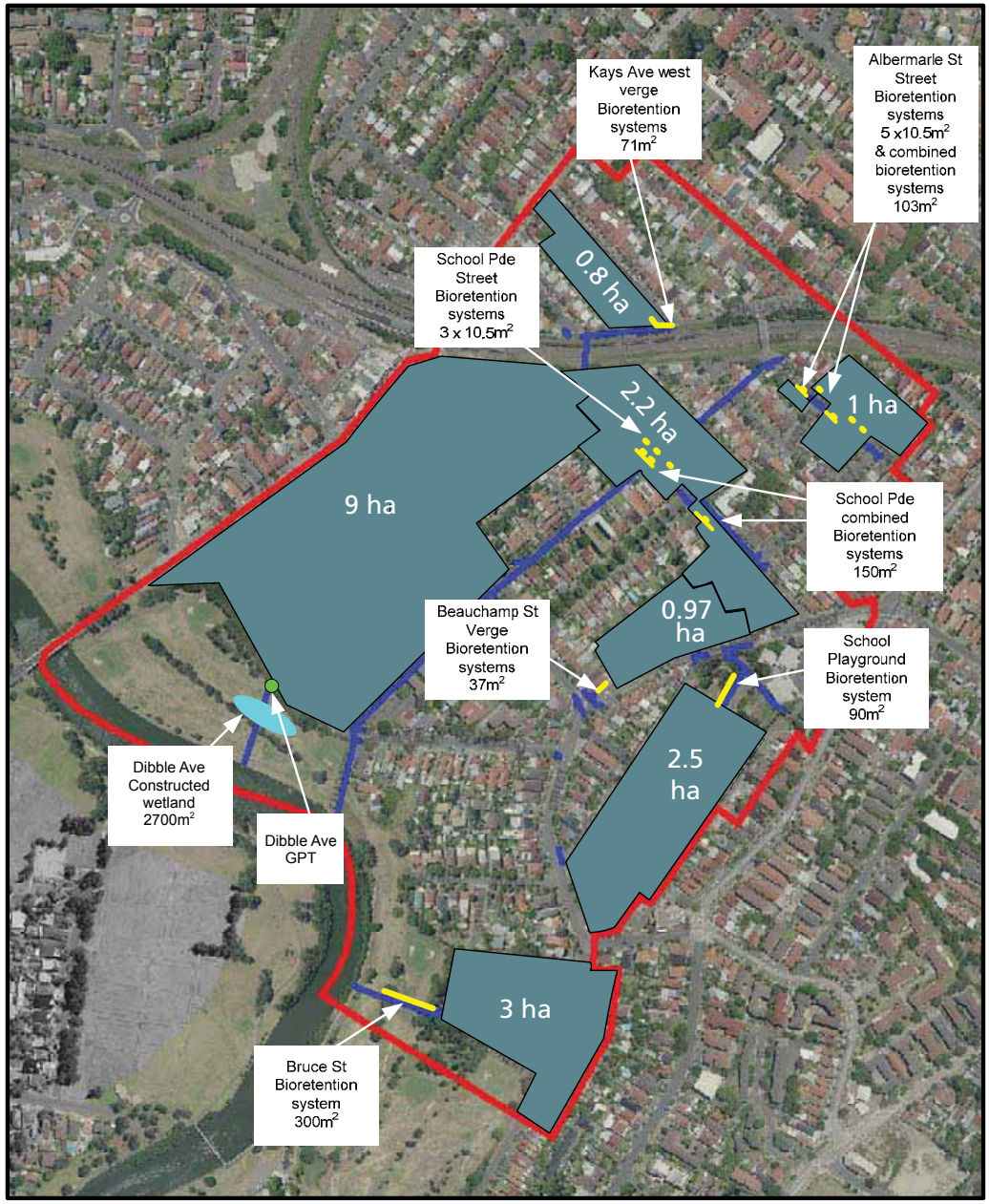
Rain gardens, swales and other WSUD systems are installed in more than 50% of the identified priority sites.

Actions

See Actions 15, 16, 17 and 18.

The Thornely Street Rain Garden, Marrickville South, built April 2010.

Photos top and bottom: Participants at Hill Street Rain Gardens on WSUD tour, June 2009.



Sites in Riverside Crescent Subcatchment with recommended stormwater runoff treatment systems, showing the catchment areas of each system (BMT WBM, 2010).

Development of Options

A range of potential on-ground works to treat runoff going to the Cooks River were developed for specific locations following the vision sessions and planning forum. These include the Marrickville Golf Course, Marrickville West Public School and a number of sites on streets, as shown on the aerial map on this page.

These ideas for works were further developed to:

- find out how feasible they are;
- look at opportunities and constraints;
- work out potential reductions in pollution to the Cooks River; and
- calculate approximate water savings that could be achieved.

Further assessment was carried out to develop a strategy to improve stormwater runoff into the Cooks River as outlined in the consultant's report (BMT WBM, 2010).

The subcatchment planning also included identifying on-ground options for stormwater harvesting and flood mitigation. Many stormwater harvesting opportunities and flood mitigation measures were suggested as possible. To date, none has proved feasible for Council to include in this plan. However, investigations are continuing so that stormwater harvesting and flood mitigation options will be incorporated into this plan at its first annual review.

Options for Treating Stormwater Runoff

The feasibility study by BMT WBM (2010) for possible stormwater runoff treatment systems looked at:

1. their rates of removing pollution (Total Suspended Solids, Phosphorus, Nitrogen, and Gross Pollutants); and
2. the estimated costs of building each of them.

The recommended systems identified here would be expected to last for about 50 years.

	Total treatment (entire catchment)	School Pde	Henson St	Kays Ave west	Albermarle St	Beauchamp St	Golf course, near Bruce St	Golf course, near Dibble Ave	Golf course, near Dibble Ave
Treatment catchment area (ha)	48.8	2.2	2.5	0.8	1	0.97	3	9	9
Type of treatment system	various	Bioretention	Bioretention	Bioretention	Bioretention	Bioretention	Bioretention	GPT	Wetland
% Total Suspended Solids removal	35%	76%	62%	78%	79%	62%	72%	43%	60%
% Total Phosphorus removal	22%	56%	44%	56%	58%	43%	51%	0%	52%
% Total Nitrogen removal	10%	21%	13%	21%	22%	13%	18%	0%	27%
% Gross Pollutants removal	55%	100%	100%	100%	100%	100%	100%	49%	100%
Total construction	NA	$23,752	$13,779	$11,486	$15,293	$6,981	$16,184	$52,885	$306,552
Annual Maintenance	NA	$4,679	$3,680	$3,396	$3,853	$2,727	$3,951	$2,265	$5,998
Establishment cost	NA	$4,679	$3,680	$3,396	$3,853	$2,727	$3,951	$0	$5,998
Establishment Period (yrs)	NA	1	1	1	1	1	1	0	3
Total construction and establishment cost		$33,110	$21,139	$18,278	$22,999	$12,435	$24,086	$55,150	$318,548

5. Glossary

Term	Meaning in Subcatchment Planning.
Action Plan	A planning guide for council officers, subcatchment residents, other community members and stakeholders that provides the direction for council and the community to achieve the water vision.
Adaptive management	Management approach that promotes change and learning by identifying and accepting that there are uncertainties. It uses an experimental approach.
ANZECC	Australian and New Zealand Environment Conservation Council - has developed guidelines for water quality.
ANZECC Trigger Value	The concentrations of the key performance indicators (e.g. nutrients) measured for the ecosystem. They indicate a risk of environmental impact and should 'trigger' some action for management and remediation if the concentrations are not met.
Biophysical	Relates to the combined study of physics, maths, chemistry and biology to effectively model and understand how biological systems work.
Bioregional	Defines the context for environmental management by natural boundaries (e.g. watershed, biophysical boundary, or area of concern of local community). A bioregional structure would mean identifying regional priorities for environmental management while encouraging local action and ownership of the process. This requires an integrated approach that coordinates diverse management processes and achieves multiple goals.
CALD	People from culturally and linguistically diverse backgrounds.
Capacity building (organisational)	See 'Organisational capacity building'.
Catchment	An area where water is collected. In a catchment, all rain and run-off water eventually flows to a creek, river, lake or ocean, or into the groundwater system.
Context mapping	Assessing the social, physical, organisational, policy and political influences on the subcatchment at the time of planning.
DCP	Development Control Plan made under Section 72 of the Environmental Planning and Assessment Act 1979. It outlines councils' detailed planning policies for land uses and the design of new development.
Ecology	The scientific study of the interaction between living things and their environment.
Ecosystem	The relationship between environment, living organisms and non-living structures within a connected system. An example would be a desert, coral reef or ice cap.
Evapo-transpiration	The loss of water from the soil, water surface and plants.

Term	Meaning in Subcatchment Planning.
Fit-for-purpose	The water is suitable for the purpose for which it is used. An example is using rainwater to irrigate the garden and flush the toilet, rather than using potable water.
Governance	"How power within society is maintained, exercised, delegated and limited. In the context of an organisation or 'corporate' governance, it is the way decisions are taken, communicated, monitored and assessed" (Adapted from ANZSOC, 2009)
Gradient	Slope - either ascending or descending.
Gross pollutant trap (GPT)	Devices that trap coarse pollutants in stormwater - especially litter and coarse sediments.
Gross Solids	Pieces of debris larger than 5mm such as cigarette butts, leaf litter, grass cuttings and pebbles.
Hydrocarbons	Type of chemicals found in crude oil. Petrol, diesel and lubricating oils contain hydrocarbons. In waterways, they cause visual and chemical pollution, endangering plant and animal life. Hydrocarbons do not mix with water and form oil slicks on the water surface.
Hypoxia	Hypoxia means oxygen depletion. Healthy water contains oxygen that plants and animals use to live. When a waterway's oxygen level falls below a level that can sustain life, the waterway is said to be in a state of hypoxia.
Impervious	A surface that cannot be penetrated. Pavements, concrete, roofs and roads are usually impervious to water.
Infiltration	The act of water penetrating into soil.
Inorganic matter	Things that do not break down to form carbon are inorganic. Examples are metals, phosphates and chlorine bleach.
Integrated Urban Water Management (IUWM)	A holistic approach to urban water management and planning. Water supply, stormwater and wastewater are all seen as parts of an integrated physical system that is influenced by the social characteristics, organisational framework, and the natural landscape.
Lead	Lead is a heavy metal used in car batteries, some paints, roof materials and some fuels. It is a toxic metal that can cause blood and brain disorders.
Local Environment Plans (LEPs)	These are the most prominent and legally enforceable of council planning documents and include controls on zoning and permissible land uses, and relevant local planning issues such as aircraft noise, flooding and contamination.
Masterplan (also Management Study)	A technical guide for engineers, environmental managers and hydrologists that highlights the most feasible on-ground options, their modelled water quality and flow outcomes, and costings for each.

Term	Meaning in Subcatchment Planning.
Modelling	Use of computer software to test scenarios and generate site specific data
Multidisciplinary	Involving people from different professional backgrounds in an activity, including technical and non-technical experts and practitioners.
Nutrients	Chemical elements and compounds found in the environment that plants and animals need to grow and survive. In subcatchment planning, nitrogen and phosphorus are the nutrients of interest if levels are exceeded.
Organic matter	Things that break down and release carbon are organic. Leaves, grass cuttings, twigs and plants are all organic matter.
Organisational capacity building	The development of skills, management practices, strategies, and systems to improve an organisation's effectiveness, sustainability and ability to fulfil its vision and objectives
pH	The strength of acids and alkalines/bases. pH is measured on a scale of 1 - 14 with 1 - 6 being classed as acid and 8 - 14 alkaline. Pure water has a pH value of 7, the level a normal waterway should be. If pH varies too much, it can affect plant and animal life.
Potable water	Drinking quality water
Phosphorus	A chemical element essential for life, phosphorus is a plant nutrient. Pesticides and detergents usually contain phosphorus. When too much phosphorus enters waterways, plant growth increases, putting pressure on oxygen and contributing to algal blooms.
Physical profiling	The physical context of planning, including hydrology, topography, area of open space, land use and land ownership, current water infrastructure, and pollution sources and hotspots in the area and modelling different solution possibilities, including retrofitting.
Potable water	Drinking quality water.
Rain gardens	A garden that includes a combination of native plants, shrubs and grasses that soak up stormwater and nutrients. Most are designed to allow small rain fall events to infiltrate the soil.
Run off	Water that does not soak into the ground due to the surface being hard (impervious) or waterlogged.
Sediments	Small particles that get carried in water. The particles eventually settle to the bottom of a body of water.

Term	Meaning in Subcatchment Planning.
Social profiling (also community profiling)	A way of learning about the characteristics of the community in a particular area, including population characteristics, community attitudes, values and practices.
Stormwater	Water from rain that 'runs off' across the land instead of seeping into the ground.
Subcatchment	A local watershed where all the rain falling in to the area flows to the same waterway (or stormwater drain).
Subcatchment management plan	Plan for the subcatchment that has the subcatchment water vision, an action plan identifing the ways to achieve the vision, and the masterplan of on-ground works and other technical information, subcatchment profiles and any other studies relevant to the planning area.
Suspended solids	Undissolved substances in water that make the water cloudy (turbid).
Swales	Shallow, open channels designed to slowly transport stormwater reducing velocity of the water and allowing some water to soak into the soil.
Topsoil	The surface soil that is rich in organic matter and contributes to plant nutrition. Topsoil forms very slowly so it is important to protect it for plant growth.
Trunk drain	Trunk drains are large channels or pipes that link an area's drainage system. During times of heavy rain, they assist in capturing and dispersing excess water as part of an areas flood management scheme.
USWIM	Marrickville Council's Urban Stormwater Integrated Management project.
Wastewater quality indicators	A set of tests carried out on water samples to find out if the water is safe to support plant and animal life.
Water cycle	The cycle where water evaporates from the soil, water surface and plants, and accumlates in the clouds and then returns to the Earth through rain.
Water Sensitive Urban Design (WSUD)	The sustainable management of water within urban areas through intelligent and integrated design. It looks at the urban water cycle as a whole, taking into account all urban water sources: potable water, wastewater, and stormwater.

6. References

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2. Australia and New Zealand School of Government's (ANZSOG) Institute for Governance, 2009. *What is governance?* University of Canberra. Available online: http://www.governanceinstitute.edu.au/about-us/what-is-governance

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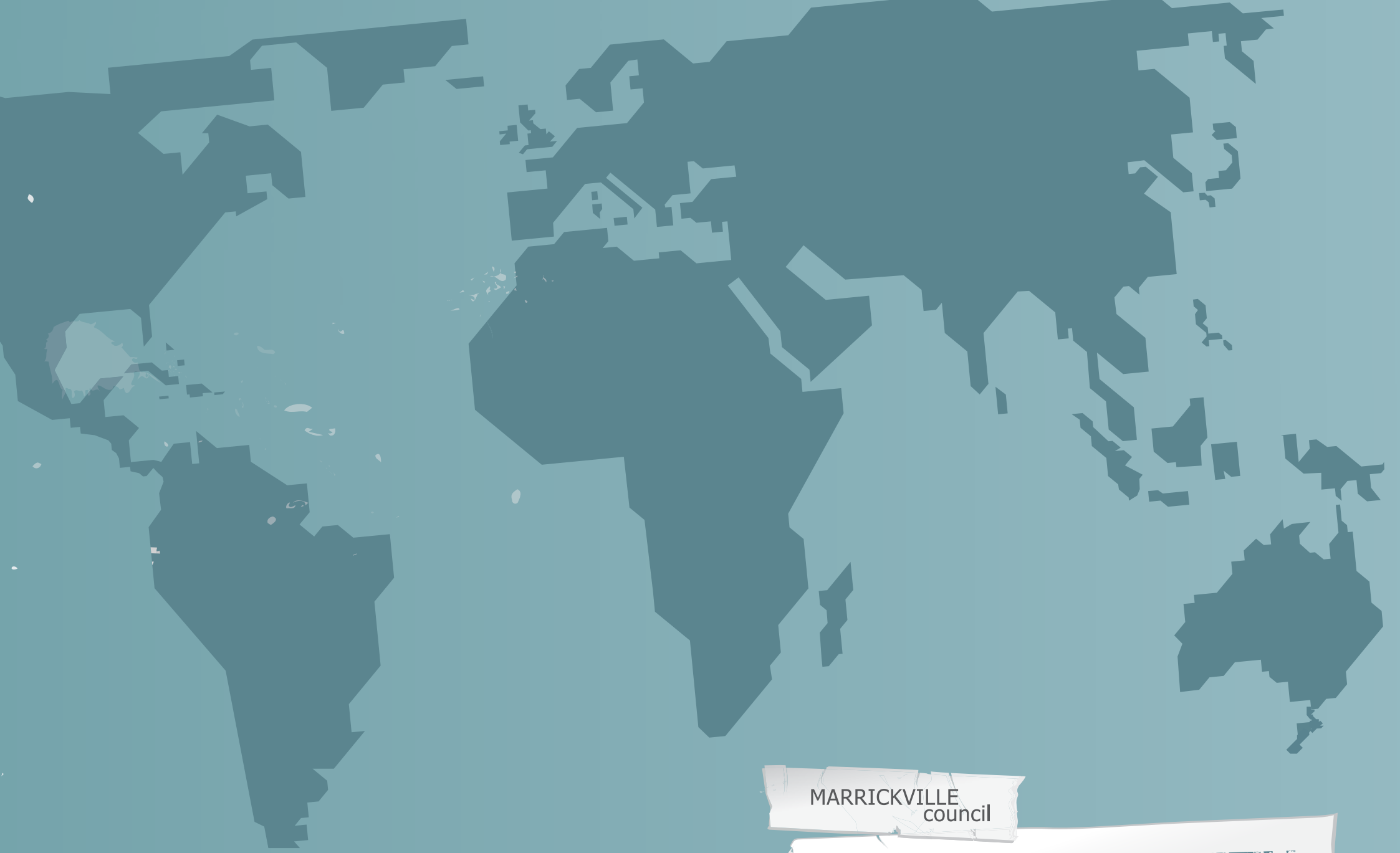

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