

We are all Cooks River People

MARRICKVILLE
Council

WATEREVOLUTION

Funded by the Marrickville community through the Stormwater Charge

Western Channel Subcatchment Management Plan 2014



Western Channel Community Water Vision 2060	1
1. Planning the Western Channel Subcatchment	2
1.1 Background to subcatchment planning	2
1.2 How we planned Western Channel Subcatchment	3
2. About the Western Channel Subcatchment	5
3. Western Channel Subcatchment 2060 Vision, Goals, and Action Plan	17
3.1 Western Channel 2060 Vision	17
3.2 Western Channel 2060 Goals	17
3.3 Western Channel 2024 Goals	18
3.4 Western Channel Action Plan	19
4. Sustainable Water Management Options	23
4.1 Greening wide footpaths	24
4.2 Greening laneways	25
4.3 Greening wide roads	26
4.4 Rain gardens	27
4.5 Opportunities in public open space	30
4.6 Other opportunities	31
5. Glossary	33
6. References	35

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Cover: Illawarra Road, 1946 (Marrickville Library History Collection).

In 2060, Western Channel Subcatchment is peaceful. We know and talk with each other and there is a harmonious and natural connection in our community. We are a diverse mix of people, sharing a spirit of cooperation, caring for each other, the waterways and the environment. Communal spaces such as community gardens abound.

We work with governments and land managers to support green infrastructure and community wellbeing. Marrickville Road and Illawarra Road are eye-catching with thriving businesses and good services employing local people.

The Cooks River is natural and clean with vegetated banks. We swim and kayak near the Cooks River Life Saving Club. We can see the creeks leading to the river and diverse native wildlife such as parrots, butterflies and bandicoots are regular sights. Our healthy natural environments help to manage stormwater.

We are connected to our urban spaces that are planted with resilient native vegetation to attract more wildlife. Birdsong fills the air. Our streets, homes and parks are thriving habitat corridors through our suburbs that are richly biodiverse with local native plants and animals.

All our buildings, streets and neighbourhoods are smart, green, waterwise and produce food. Our streetscapes are people-focused and paths meander under the tree canopy and stay cool in summer. Courtyards provide shared green spaces. Greenroofs and walls are everywhere. Water infiltrates to recharge aquifers. Rain is harvested and stored for later use. Overhead cables are a thing of the past. The long-running container deposit laws were a great success and advances in packaging technology have eliminated 'waste.'

In 2060, Western Channel Subcatchment is our inner-city oasis.



Western Channel Subcatchment

1.1 BACKGROUND TO SUBCATCHMENT PLANNING

Marrickville Council is aiming to make the Marrickville local government area a *water sensitive community* and has developed the Strategy for a Water Sensitive Community (2012) that sets out the ways to get there.

Through the **Waterrevolution** program, funded by the Marrickville Stormwater Management Service Charge, Council and citizens are gradually changing the way they think about and manage water. The subcatchment planning program is key to bringing about this change by developing a plan for the subcatchments in the Marrickville local government area.

Collaborative and integrated planning approach

The **Waterrevolution** approach to water management 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 implementing sustainable water management and best practice governance (see box right) to improve the quality of stormwater going into waterways, reduce dependence on drinking quality water brought from outside the catchment, and improve flood preparedness. 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, (bio)physical 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; and,
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 suit local conditions and are flexible enough to include new information, practices and technologies over time.

It is beyond Council's ability to achieve all that is required to become a water sensitive community. Therefore, by working with citizens and businesses, this approach encourages planning on private property and builds Council and community relationships, recognising that sustainability is a whole of community issue that government cannot address alone.

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 Plan in Dulwich Hill in 2009, the Riverside Crescent Subcatchment Plan in 2010, the Eastern Channel East Subcatchment Plan in 2011 and the Eastern Channel North Subcatchment Plan in 2013. The Western Channel Subcatchment Plan is the sixth plan. The subcatchment plans are reviewed regularly to track progress and have a major review every five years by Council and subcatchment stakeholders, including the subcatchment working groups.

WATER SENSITIVE COMMUNITY

A Water Sensitive Community supplies water from within its catchment, provides green infrastructure to support ecosystem services and participates in making plans, designs and decisions that are water sensitive (Marrickville Council, 2012).

Marrickville strategies to become a Water Sensitive Community:

1. Reduce the use of potable mains water in homes, businesses, Council facilities and public spaces.
2. Manage the stormwater system and its impacts on the urban environment.
3. Support regional projects to improve the health of the Cooks River, Botany Bay, Lower Parramatta River, Sydney Harbour and their catchments.
4. Implement sustainable urban water management.

(Marrickville Council, 2012)

Best practice governance:

1. Work with the people who live and work in the area.
2. Improve the ability of Council, other governments and land managers to manage water sustainably, e.g. develop skills, collect and share data, learn from evaluation.
3. Integrate planning and projects.
4. Communicate progress and results to all stakeholders.

(Adapted from *Principles of Best Practice Governance*, Brown 2008)

1.2 How we planned Western Channel Subcatchment

Planning the Western Channel Subcatchment was done in partnership with local residents, schools, community groups, businesses and stakeholders including Sydney Water. The aim is to collaboratively develop a long-term management plan to address stormwater issues in the subcatchments and meet the Strategy for a Water Sensitive Community objectives.



Collaborative planning process in Western Channel Subcatchment

Collaborative planning

To create the *Western Channel Subcatchment Plan*, the collaborative process, shown left, involved stakeholders at each stage of planning and decision making, including creating the vision, goals and actions, and finding possible solutions. Western Channel will integrate stormwater quality management and reuse opportunities through Council’s collaborative planning process. Flood management will be incorporated when the Marrickville Valley Flood Management Plan has been finalised.

1. Multidisciplinary team

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

2. Context Mapping

The context mapping (see 2, left) included the Western Channel Subcatchment’s history, community make up, water cycle, and the other details shown in Section 2.

The physical profiling included the Marrickville Valley Flood Study (WMAwater, 2011) following the process set out by the NSW Government (2005). The study identifies flood prone areas and impacts of different sized storm events.

Context information was presented in the *Planning the Western Channel Subcatchment* information booklet (2013) that was given to all who took part in the planning process. Everyone then had access to a broad range of relevant information and a good common understanding of the planning environment, creating the conditions for successful communication and decision making between disciplines and participants.

Stakeholders invited for interviews and/or to planning sessions included:

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

Major land managers, water users and decision makers, such as Ferncourt Public School and Sydney Water Corporation were invited to be part of the planning and exploring of possibilities for on-ground works and capacity building initiatives.

The combined knowledge of local water issues with participant aspirations helped Council develop a better understanding of the solutions that will be most appropriate for the community, environment and economy of the subcatchment.

3. Creating the Vision

All residents, schools and businesses in the Western Channel Subcatchment were invited to vision sessions during February 2014. *The Western Channel Subcatchment 2060 Vision* results from the ideas from the five vision sessions. Representing community desires, it is the reference point for planning the Western Channel Subcatchment.

4. Setting Goals and Actions

The community vision was the basis of the planning forum held over two nights in March 2014. On the first night, the forum made up of a group of residents, and staff from Council and Sydney Water Corporation developed goals and possible actions to reach the 2060 vision. On the second night, the group developed the short-term 2024 goals and actions.

5. Western Channel Subcatchment Management Plan

The Western Channel Subcatchment Management Plan will integrate flood management with stormwater quality and reuse. The plan includes the subcatchment vision, goals and the action plan in Section 3. Recommendations for stormwater treatment are outlined in Section 4.

Western Channel Subcatchment Working Group

Following the vision sessions and planning forum, the Western Channel Subcatchment Working Group of local residents and businesses was established to refine and prioritise the actions and review the proposed on-ground options. The working group will continue to partner with Council to implement and assess the action plan, and provide feedback.



Western Channel Community vision session, 2014



Western Channel Community vision session, 2014



Western Channel Community planning forum, 2014

2. About the Western Channel Subcatchment

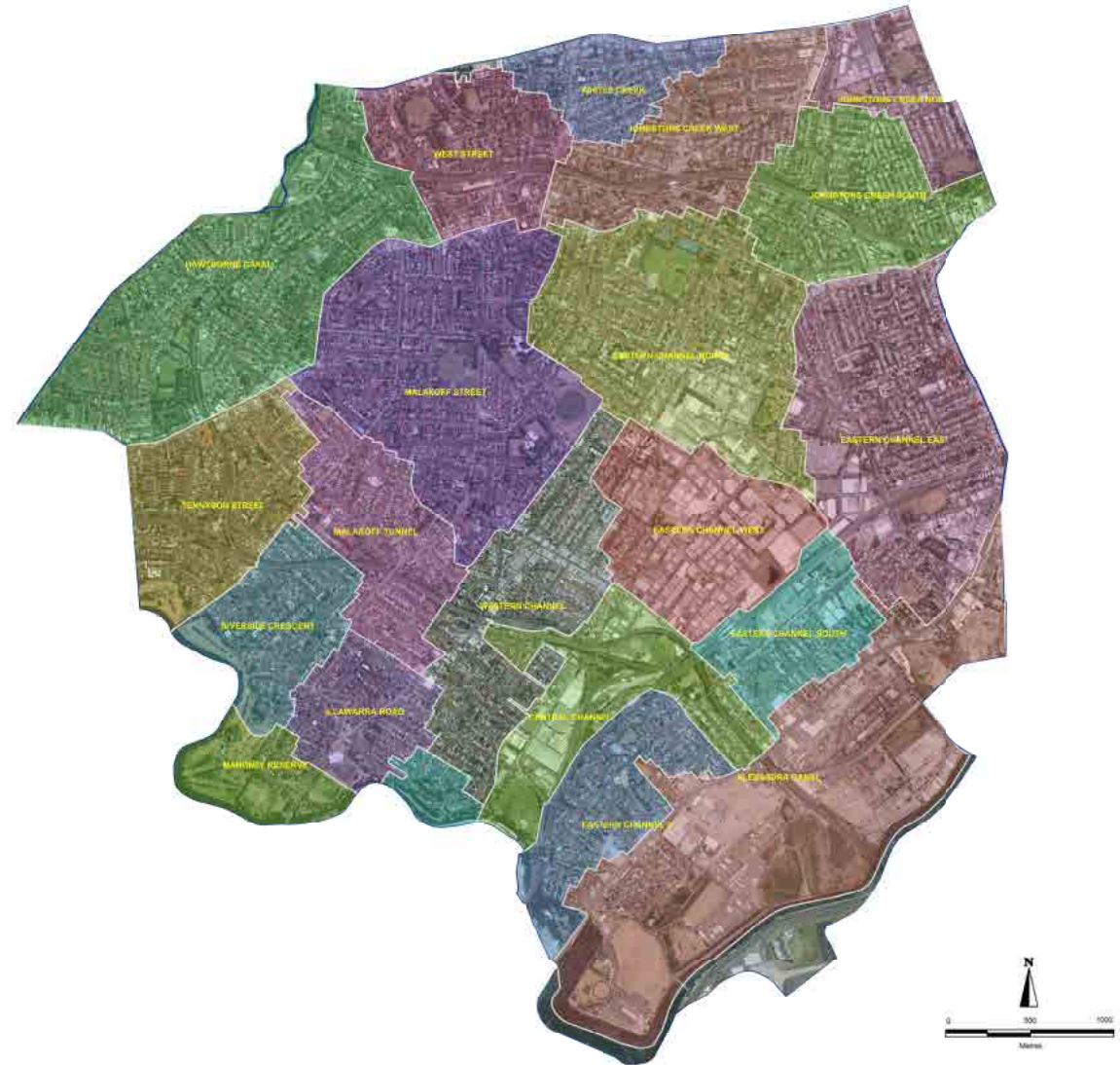
Overview

The Western Channel Subcatchment is located in the central and southern part of the Marrickville local government area and covers parts of Marrickville:

- From Woodland Street in the north to Premier Street in the south
- From Malkoff Street and Fletcher Street in the west to Victoria Road and Junction Street in the east
- Including part of the Illawarra Road and Marrickville Road commercial centre
- Including Marrickville Station and part of the Bankstown railway line

Fast Facts

- 81 hectares
- Population 4,930 (6% of Marrickville LGA) (ABS 2012)
- 1,807 residential dwellings
- Mostly residential
- Retail and commercial areas along Marrickville Road and Illawarra Road
- Parks and reserves including:
 - McNeilly Park (eastern side only)
 - Murdoch Park
 - O'Hara Playground



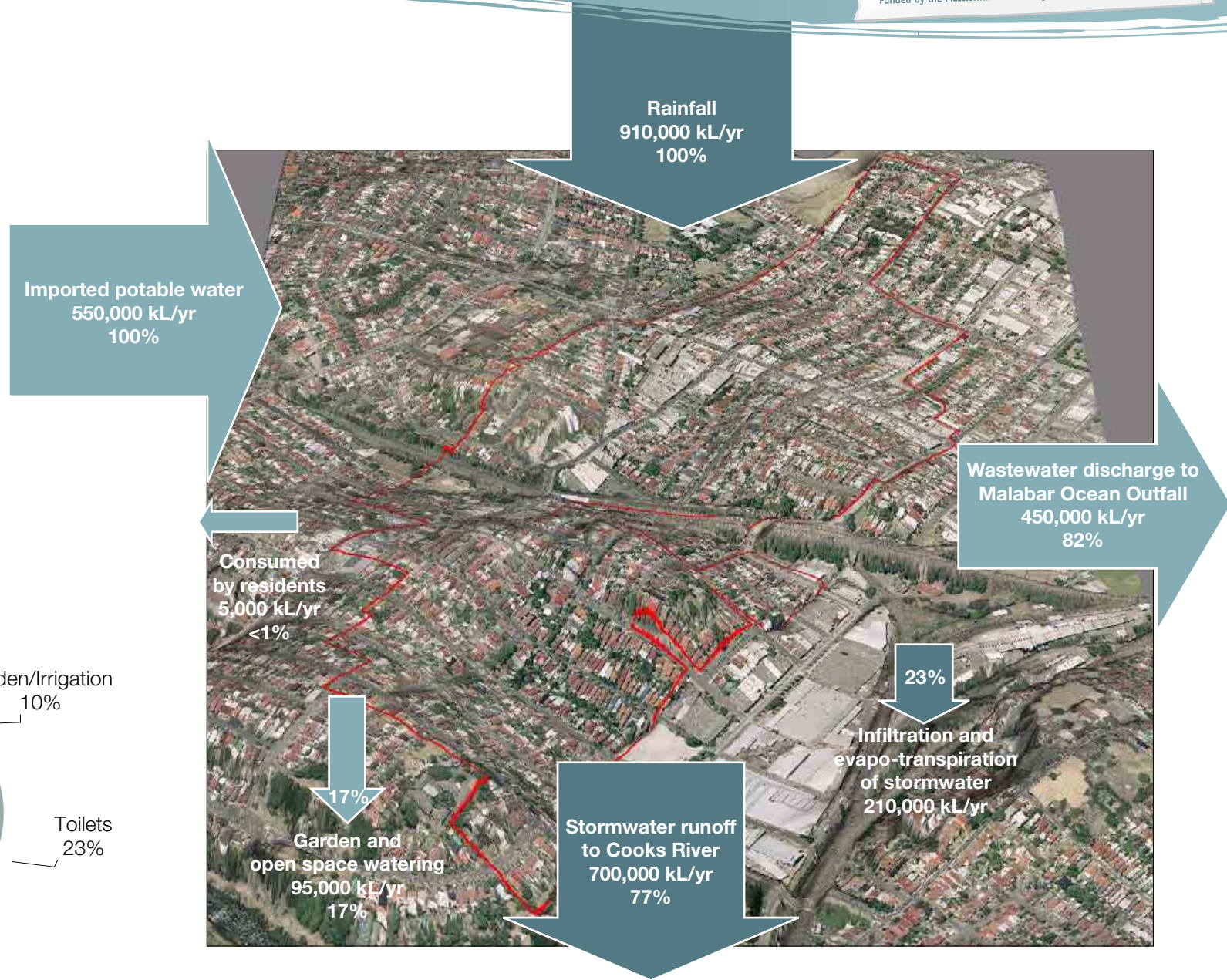
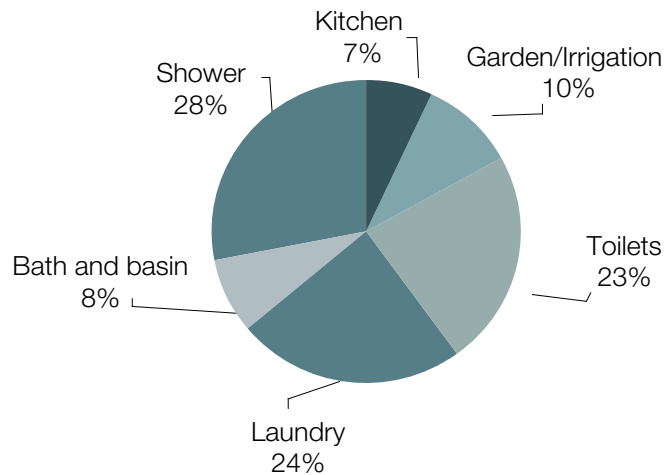
Subcatchments in Marrickville LGA, highlighting the Western Channel Subcatchment

2.1 Western Channel Subcatchment Water Cycle

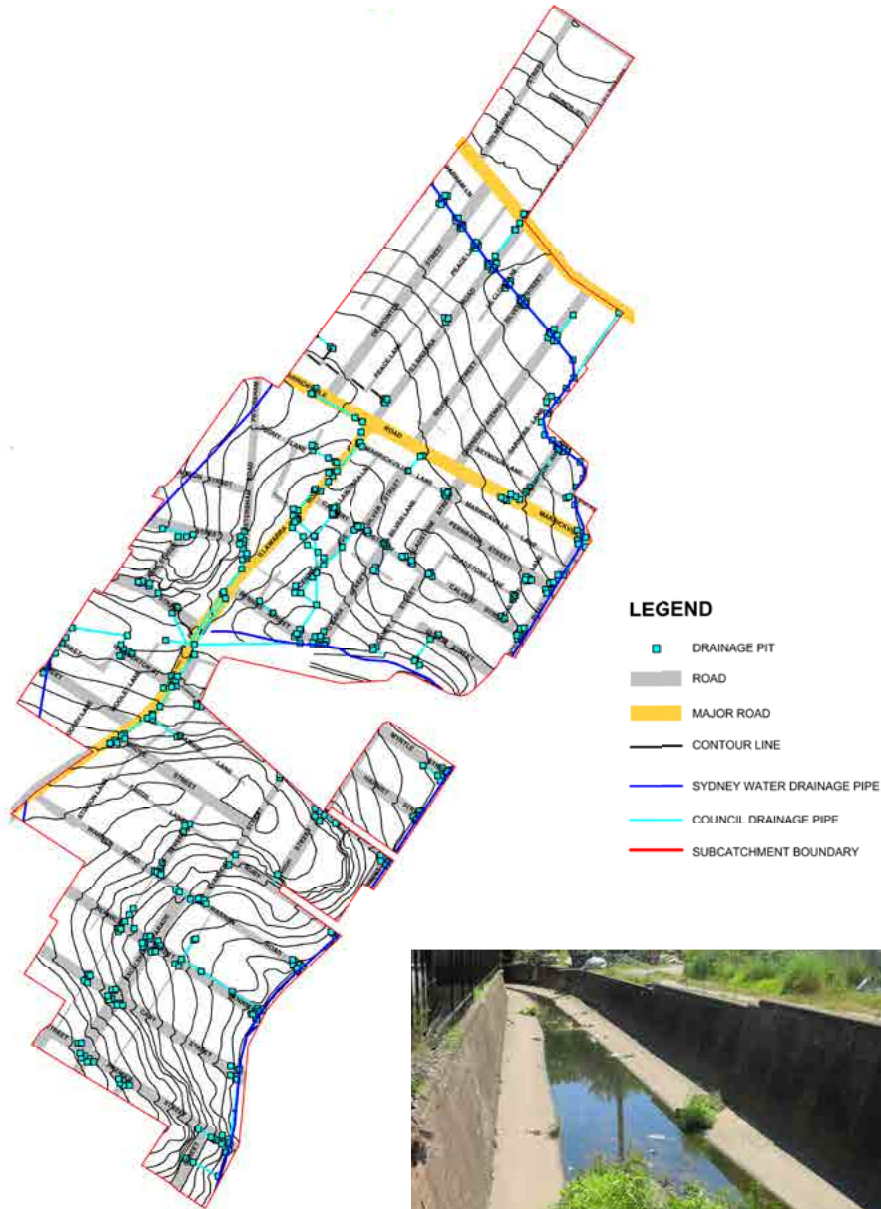
The water cycle in the Western Channel Subcatchment is based on research and data from the Bureau of Meteorology, Sydney Water, and stormwater modeling.

A study of the urban water balance highlights where potable (drinking quality) water savings can be made through harvesting rainwater and stormwater. Stormwater harvesting also provides an opportunity to treat stormwater and reduce the amount of pollution going into the Cooks River.

Household Water Use



2.2 Contours and Drainage Network



The Western Channel at Myrtle Street

The contour map on the left shows the gradient of the Western Channel Subcatchment with its ridges and valleys and the locations of the stormwater drainage pits and pipes. The Subcatchment has moderate grades from the ridgelines to the lower areas on the eastern side of the Western Subcatchment.

The Subcatchment is highly modified and does not follow the natural topography of the landscape. Three smaller subcatchments that would have originally flowed to the Gumbramorra Swamp have been diverted to the Sydney Water owned Western Channel before flowing to the Cooks river.



Western Channel alignment

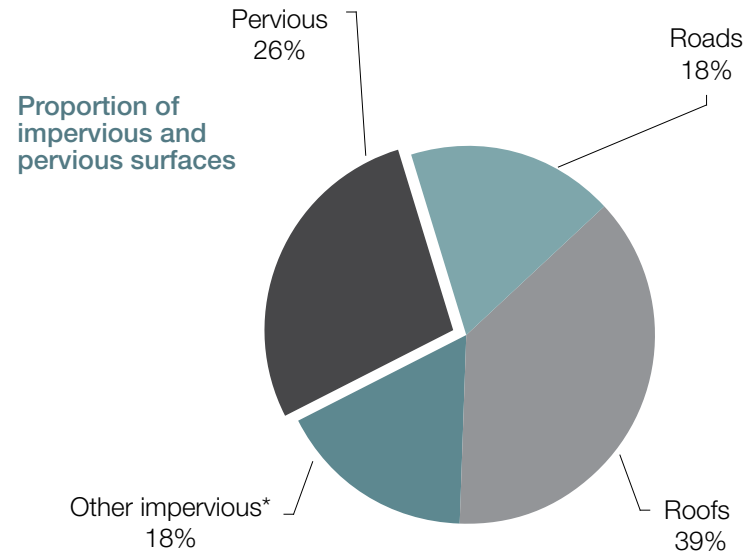
- Stormwater Channel
- Underground channel
 - Open channel
 - Western channel catchment

The route of the Western Channel through the Subcatchment

About 78% of the Western Channel Subcatchment is made up of hard and impervious surfaces. Of the total hard surfaces, roofs make up the majority (50%), followed by driveways (26%) and roads and pavements (24%). These hard surfaces generate approximately 95% of pollutants found in stormwater in the Subcatchment.



Left: Illawarra Road, Murrickville. Right: Western Channel near Myrtle Street, Murrickville



*Includes footpaths, driveways etc

Subcatchment Pollution Levels

The table below shows the estimated amount of pollutants currently found in stormwater in the Subcatchment. The long-term aim is to meet the Best Practice Stormwater Targets set by the Botany Bay Water Quality Improvement Program (Sydney Metropolitan Catchment Management Authority, 2011) to improve stormwater quality.

Pollutant	Estimated Mean Annual Pollutant Load (kg/yr)*	Best Practice Stormwater Targets (% reduction)	Target Pollutant Load (kg/yr)
Gross Pollutants	16,000	90%	1,600
Total Suspended Solids#	150,000	85%	22,500
Total Phosphorus	300	65%	105
Total Nitrogen	2,300	45%	1,265

* Estimated with MUSIC modeling software.

Note: removal of suspended solids will result in a reduction of heavy metals and hydrocarbon loads.

These figures do not take into account the performance of existing gross pollutant traps within the Subcatchment.

Water quality modeling determines the relative pollutant contributions from the Subcatchment based on a breakdown of these impervious surface areas.

Private Property

About 68% of the Western Channel Subcatchment is private property, which contributes the majority of all pollutant 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 entering into waterways.

Public roads contribute the largest amount of phosphorous and suspended solids. The stormwater drainage network combines the runoff from public roads and 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.



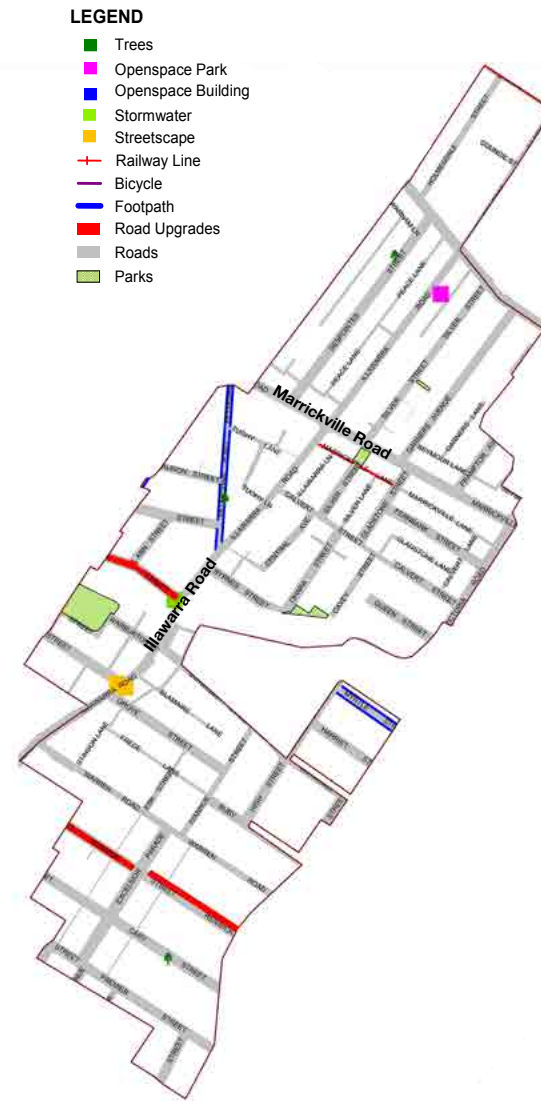
Capital Works Program

The planning process for capital works is carried out as part of the integrated planning and reporting. This includes asset management plans, the long-term financial plan, 4-year delivery plan and annual operational plan. Council has a rolling program for capital works for new infrastructure, upgrades and renewal. Stormwater drainage and water sensitive urban design (WSUD) works are currently prioritised by:

- condition – are they in good condition or should they be replaced?
- function – are they doing what they are designed / expected to do?
- level of service – do they meet community needs and expectations?
- long-term strategies and plans – are they meeting the goals of a strategy or plan?

Connecting Marrickville

Connecting Marrickville is a new initiative that will deliver more drainage and water sensitive urban design (WSUD), better footpaths, street trees, cycle ways, and local area traffic management, while building on Council's social justice, access, and Sustainable Streets programs. The program is transforming Council's approach to urban streetscape design, delivery and maintenance by integrating capital works where possible, moving Council from single-issue to place-based planning and delivery of capital works. The WSUD works proposed for Western Channel Subcatchment will be delivered through the Connecting Marrickville approach.



Above: Map of Western Channel Subcatchment showing proposed capital works over the next four years

Capital Works in Western Channel

The four-year capital works program currently includes the following capital works to be completed by 2017:

- Woodland Street - road upgrade
- Murdoch Playground - upgrade
- Garners Avenue - footpath upgrade
- Frampton Avenue car park - road upgrade
- Marrickville Road - pedestrian crossing near Frampton Avenue
- Petersham Road - footpath upgrade
- Arthur Street - drainage works
- Station Street - streetscape works
- Illawarra Road near Grove Street - streetscape works
- Myrtle Street - footpath upgrade
- Ruby Street - speed hump
- Renwick Street - road upgrade
- Warren Road - drainage works

(Note: the capital works program may change if other priority or emergency works are identified).

This page shows the stormwater issues and dumping hot spots as identified by the community and Council staff.

Dumping

Dumping is a regular problem at:

- Despointes St
- Convent Ln
- Garners Ave
- Petersham Rd
- Frampton Ave
- Tuohy Ln
- Seymours Ln
- Marrickville Ln
- Silver Ln
- Wooley Ln
- Frede Ln
- Johnston Ln

Local flooding

Stormwater ponding typically 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. Ponding and overland flows in Western Channel Subcatchment occur in:

- Despointes St
- South of Sydenham Rd along and adjacent to the Western Channel
- Cnr Marrickville Rd and Victoria Rd
- Illawarra Rd south of Marrickville Rd
- Calvert St, Central Ave and Byrnes St area
- Along the railway line near Marrickville Station
- Warburton St and Wooley Ln
- Renwick St



Overflowing bins and dumping near Marrickville Station



Western Channel trash rack on the Cooks River

Residential Dwellings

- Subcatchment area - 81 ha
- Residential dwellings - approx. 1,807*



40%
Separate houses



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



10%
1 or 2 storey residential flat building



14%
3 storey residential flat building



17%
1 storey semi, row, terrace or townhouse



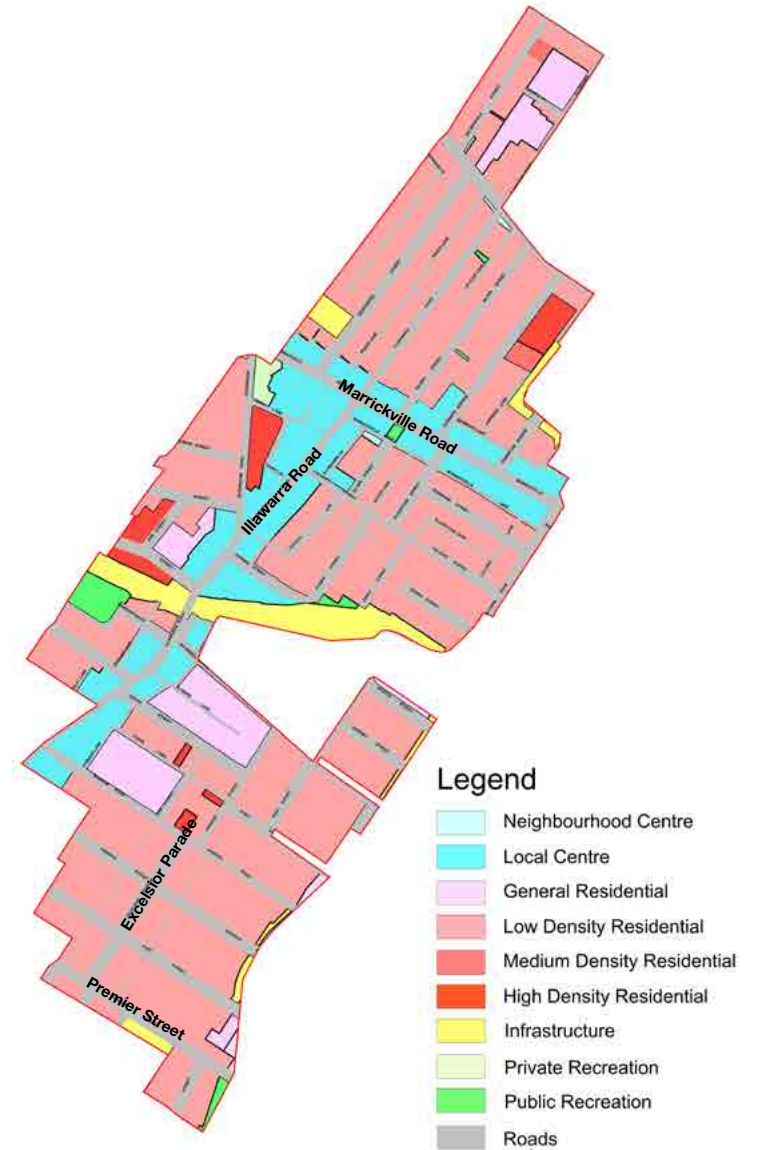
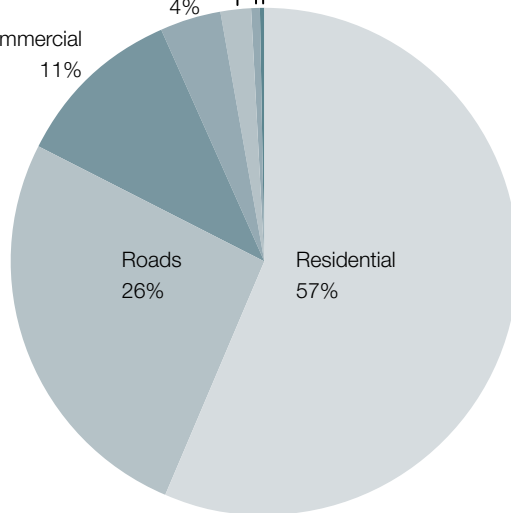
5%
4 storey residential flat building



11%
House or flat attached to a shop

Industrial 0.5%
Community Facilities 0.1%
Parks and Open Space 2%
Infrastructure 4%Commercial 11%Roads 26%Residential 57%Private Recreation
Public Recreation

Land Use



Above: Western Channel land zoning map

*Residential data from ABS 2011 Census data

Marrickville Council

The Western Channel Subcatchment falls within the Marrickville local government area. Marrickville Council manages roads, parks, playgrounds and open space. It is also responsible for implementing planning controls and services such as waste collection.

Authorities

Sydney Water Corporation

Controls wastewater and potable water infrastructure and delivery within the Subcatchment; responsible for the management of trunk drainage, the Western Channel stormwater channel and Sydney's desalination project.

Departments

Roads and Maritime Services

State Government agency responsible for building and maintaining major roads (in Western Channel these are Illawarra, Marrickville and Sydenham Roads), overseeing harbours and waterways to deliver essential services to users.

Local Land Services

Provides natural resource management, biosecurity, agricultural production advice and emergency management.

Office of Environment and Heritage

Works to protect and conserve the NSW environment, including the natural and built environment, Aboriginal country, culture and heritage and manages national parks and reserves.

Housing NSW

Provides affordable housing options for approximately 4% of residents (ABS, 2012).

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.

Transport for NSW

Provides a strategic focal point for transport coordination, policy, integrated transport service and infrastructure planning and delivery. Responsible for the management and maintenance of Marrickville Station and associated rail infrastructure.

Land Users

Schools

Ferncourt Public School, Premier Street

Retail Centres

Retail centres are located along Marrickville Road and Illawarra Road shopping strips.

Community Housing

Community housing organisations own and/or manage properties in the Subcatchment.

Places of Worship

- St Clement's Anglican Church - corner Petersham Road and Marrickville Road
- Silver Street Baptist Mission - corner Silver Street and Calvert Street
- Marrickville Church of Christ - 389 Illawarra Road



The Marrickville Festival is held annually in October along Marrickville Road and Illawarra Road

Community Services

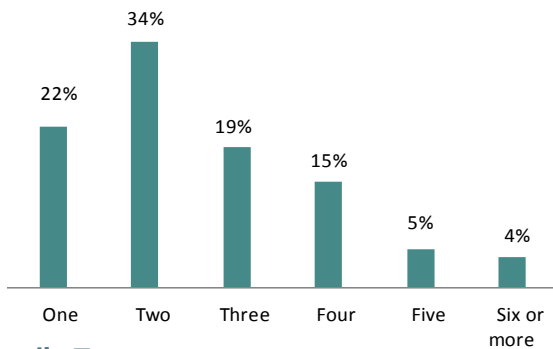
Organisation/Operation	Activities/Management	Location
Herb Greedy Hall	Meeting place for numerous cultural and community groups	Petersham Rd
Centrelink	Delivers a range of Commonwealth services to the community	Illawarra Rd
Employment Plus	Salvation Army employment services	Illawarra Rd
Marrickville Chamber of Commerce Inc.	Providing a voice for local business	Marrickville Rd
Marrickville Festival	Held annually in October to promote Marrickville	Marrickville Rd and Illawarra Rd
Marrickville Police - Local Area Command	Law enforcement assists members of the community with various policing issues and enquiries	Despointes St
Marrickville Residents for Reconciliation	Advocacy group work for reconciliation in Marrickville. Meets every second Wednesday	Illawarra Rd
Marrickville Legal Centre	Free legal advice, assistance and education to local community	Illawarra Rd
MTC Australia - Skills for Education and Employment	Not-for-profit organisation helps people to gain employment, skills training, work experience and self confidence	Illawarra Rd
Newtown Women's Domestic Violence Court Assistance Scheme	Provide address to a safe room and support worker to provide assistance through the Court process	Illawarra Rd
Rotary Club of Marrickville	Community Service Club	Marrickville Rd
Stretch-A-Family	Non-profit organisation breaking the cycle of youth homelessness	Marrickville Rd

Key Statistics

- Population: 4,930 residents
- Origin: 51% Born overseas: 10% Vietnam, 5% Greece, 3% UK
- Languages spoken at home: 37% non-English, 12% speak Greek, 8% speak Chinese 3%, 4% speak Arabic
- Travel to work: 51% by car, 30% by train, 8% by bus, 7% walk and 3% by bicycle
- Religion: 27% no religion, 20% Catholic, 12% Buddhist, 11% Eastern Orthodox, 5% Islamic, 4% Hindu

Household Density

Number of people per dwelling (density):



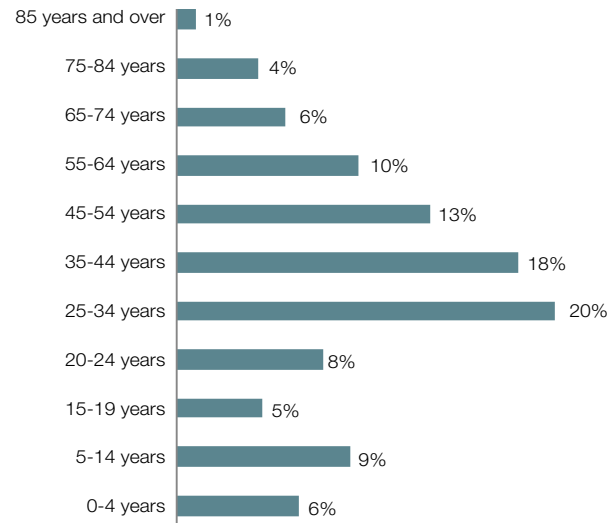
Family Types

- 39% of families are couples with no children
- 29% of families are couples with children under 15
- 9% of families are single-parent families with children under 15

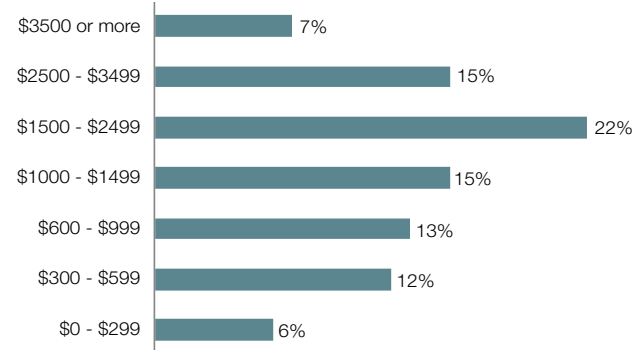
Residency Time

- 85% lived at the same address 1 year ago
- 60% lived at the same address 5 years ago

Age Distribution



Weekly household income



- More than 32% of households have income above the Marrickville median of \$1,605
- 17% of households have an income above \$2,500 per week

Education

Educational attendance 31% (1,522 people) :

- Preschool 4%
- Infant/Primary 18%
- Secondary 13%
- Technical or Further Education Institution 11%
- University or other Tertiary Institution 24%
- Other Education Institution 3%
- Institution not stated 27%

Non-School qualifications (over 15 years):

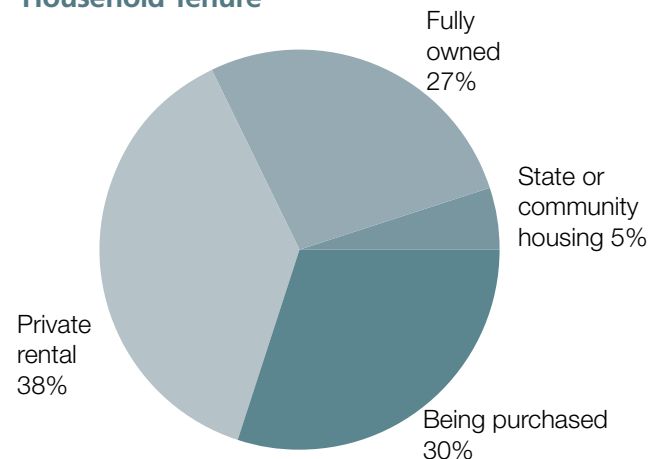
University 40%, Other 38%; not stated or not described 22%

Employment

Of the total labour force (4,027 people):

- Full time - 68%
- Part time - 25%
- Unemployed - 7%

Household Tenure



[All data from ABS 2011 Census]

Who answered the survey?

The Community Water Survey was carried out in April 2011 with 306 responses (17% of households).

Gender	60% Female 40% Male
Origin	63% Australia 17% Europe 12% Asia 2% New Zealand 2% Americas 1% North Africa & Middle East
Age	29% 40-49 years 23% 30-39 years 20% >60 years 19% 50-59 years 9% 18-29 years
Household Type	30% Couple with no children at home 28% Couple with children at home 18% Single person living alone 9% Share with family or non-family 6% One parent with child
Tenure Type	54% Fully own home 24% Buying home 18% Private rental 2% Public rental
Dwelling	42% Separate house 31% Semi-detached, terrace or townhouse 27% Flat, unit or apartment
Time in Current Residence	38% 0-5 years 31% >15 years 18% 6-10 years 12% 11-15 years
Individual Gross Weekly Income	48% \$2,000+ 27% \$1,000 - \$1,999 21% \$300 - \$999 4% \$1 - \$299

Knowledge of urban water systems

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

- 75% to the nearest waterway (correct answer)
- 20% to the sewerage system
- 3% to the sea

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

Water from:	% Responses	
The kitchen sink	11%	Incorrect
The shower	10%	Incorrect
The toilets	6%	Incorrect
The washing machine	11%	Incorrect
The garden	70%	Correct
Driveways, footpaths	86%	Correct
Other paved areas	77%	Correct
Rainwater from the roof	76%	Correct

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

- 56% underestimated daily water use
- 25% chose the correct range (300-400L per day)
- 19% overestimated daily water use

Behaviour

Of 306 households:

1. Rainwater Tanks

31 respondents (10%) indicated that they have a rainwater tank:

- 90% use for watering the garden
- 25% for toilet flushing and for laundry

2. Greywater Systems

13 respondents (4%) indicated that they have a greywater system

3. Water Saving Devices

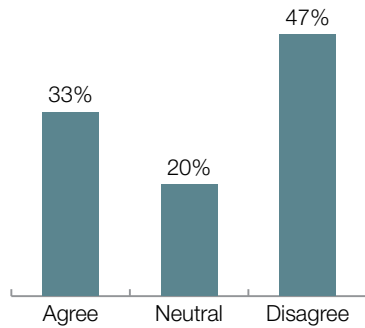
240 respondents (82%) have water saving devices such as water saving showerheads, tap aerators and toilet flush water savers

Receptivity to using rain and greywater

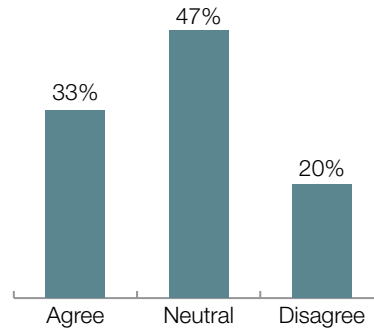
The percentage of people that would consider using rainwater and greywater, and how they would use them:

	Filtered Rainwater	Treated Recycled Water
Watering garden	89%	90%
Flushing toilet	83%	86%
Washing car	82%	80%
Washing clothes	69%	51%
Showering	55%	28%
Cooking	33%	10%
Drinking	26%	9%

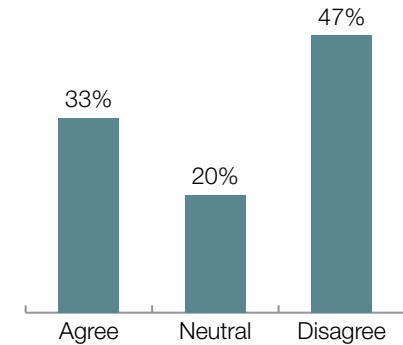
ATTITUDES TO THE WATERWAY ENVIRONMENT



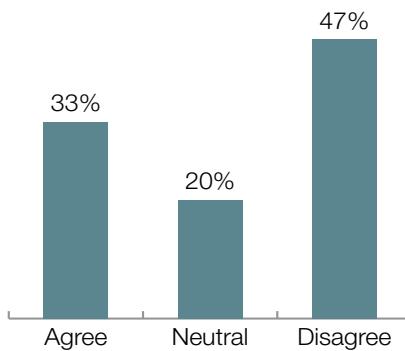
a) 'Jobs are more important than the environment.'



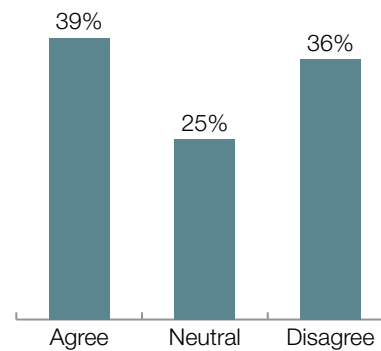
b) 'Access to a healthy natural environment is more important than access to community facilities.'



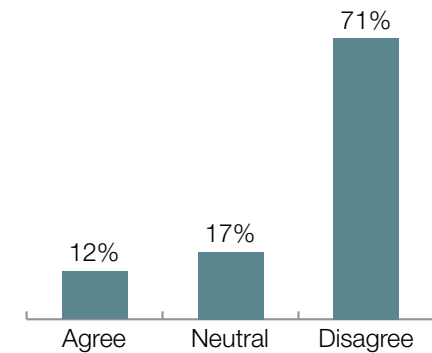
c) 'My daily activities have little negative impact on the waterway environment.'



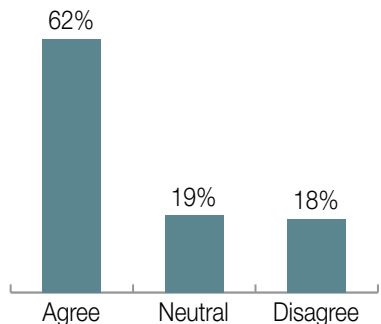
d) 'Government agencies should have the main responsibility for the waterway environment rather than the individual.'



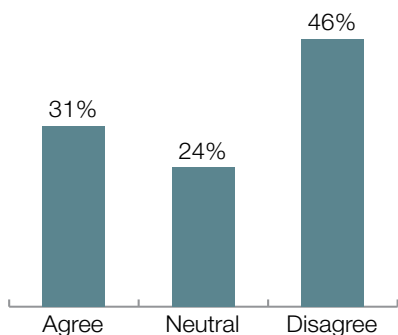
e) 'We should aim for the same waterway conditions as before the Europeans arrived over 200 years ago.'



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.'

Major environmental improvements wanted in the next 20 years.

Respondents were asked what long-term environmental improvements they would like to see:

- 45% wanted improved water management, cleaner waterways and more rainwater tanks
- 24% wanted improved green space
- 22% wanted reduced pollution
- 6% wanted renewable energy
- 5% wanted more environmental education



Business Water Survey – Summary Results

The June 2012 Marrickville Valley Business Water Survey received 52 responses:

Respondents - manufacturing (29%), retail trade (22%), wholesale trade (13%), construction (9%), professional scientific and technical (7%)

Of respondents 52% owned their premises outright, 33% leased premises privately and 13% were purchasing their premises

Water use

Two of the respondents had rainwater tanks of 20,000L and 24,000L

The table below shows the percentage of respondents that would consider using rainwater and/or greywater in their business:

Use	Filtered Rainwater	Treated Recycled Water
Flushing toilet	63%	70%
Washing car	50%	48%
Washing clothes	35%	33%
Showering	24%	22%
Cooking	22%	17%
Drinking	24%	8%
<i>In manufacturing</i>		
Food production	9%	6%
Washing	24%	24%
Cooling	22%	26%
Other	11%	11%

Attitudes

The majority of respondents (64%) agreed that: "Most people want to help improve the health of the waterway environment."

3. Western Channel Subcatchment Vision, Goals and Action Plan

3.1 WESTERN CHANNEL SUBCATCHMENT 2060 VISION

The Western Channel Subcatchment 2060 Vision has been created by the Subcatchment community at a series of vision sessions and planning forums in 2014. The community goals set out clear aims for the Subcatchment for the year 2060, as well as interim goals for 2024, which will help achieve the 2060 goals.

Western Channel Subcatchment Vision for 2060

In 2060, Western Channel Subcatchment is peaceful. We know and talk with each other and there is a harmonious and natural connection in our community. We are a diverse mix of people, sharing a spirit of cooperation, caring for each other, the waterways and the environment. Communal spaces such as community gardens abound.

We work with governments and land managers to support green infrastructure and community wellbeing. Marrickville Road and Illawarra Road are eye-catching with thriving businesses and good services employing local people.

The Cooks River is natural and clean with vegetated banks. We swim and kayak near the Cooks River Life Saving Club. We can see the creeks leading to the river and diverse native wildlife such as parrots, butterflies and bandicoots are regular sights. Our healthy natural environments help to manage stormwater.

We are connected to our urban spaces that are planted with resilient native vegetation to attract more wildlife. Birdsong fills the air. Our streets, homes and parks are thriving habitat corridors through our suburbs that are richly biodiverse with local native plants and animals.

All our buildings, streets and neighbourhoods are smart, green, waterwise and produce food. Our streetscapes are people-focused and paths meander under the tree canopy and stay cool in summer. Courtyards provide shared green spaces. Greenroofs and walls are everywhere. Water infiltrates to recharge aquifers. Rain is harvested and stored for later use. Overhead cables are a thing of the past. The long-running container deposit laws were a great success and advances in packaging technology have eliminated 'waste.'

In 2060, Western Channel Subcatchment is our inner-city oasis.

3.2 WESTERN CHANNEL SUBCATCHMENT 2060 GOALS

In 2060:

1. The Western Channel Subcatchment vision is supported by all the community.
2. Knowledge, skills and places are shared fairly to sustain our community and resources.
3. We work together to create and manage multipurpose infrastructure that benefits all our community.
4. All runoff into the Cooks River is of a suitable quality for recreation and for healthy natural systems.
5. 60% of the Western Channel is naturalised, thriving, accessible and valued by the community.
6. 75% of vegetation in Western Channel Subcatchment is local native species with an enriched integrated habitat network* that connects to local waterways and the Cooks River.
7. Diverse public and private spaces are available for growing food.
8. All development makes a positive contribution to the Subcatchment community by providing shared open spaces, green infrastructure and smart technology.
9. A quarter of the road reserve area is green space for people and nature.
10. All cables in Western Channel Subcatchment are underground.
11. Western Channel Subcatchment's imported potable water consumption has reduced by 90% on 2014 levels.
12. 50% of rainfall is captured or infiltrated.

*The Marrickville Biodiversity Strategy (2011) refers to this as an *urban habitat mosaic*.

In 2024:

1. The majority of the Western Channel Subcatchment community is aware of and understands the vision, its goals and the need to better manage water and the environment.
2. Places of shared learning encourage, support and raise understanding of water management through the generations.
3. Council and the community have been using a place-based approach for working together to get the best results from our planning, including for water, for 8 years.
4. 10% of the catchment area is connected to vegetated stormwater treatment systems.
5. 10% of the Western Channel has been naturalised.
6. Open areas in the catchment has been revegetated to increase biodiverse areas by 20% on 2014 levels so diverse native wildlife is a regular sight.
7. 10% of the road reserve area is green space for people and nature.
8. A plan is in place to support utility companies to install cables underground to facilitate implementation of water sensitive design and green space for people and nature.
9. A program is in place for growing food in shared public and private spaces.
10. Demonstration sites in or near Western Channel Subcatchment provide diverse examples of shared spaces, green infrastructure and smart technology.
11. Water consumption practices in Western Channel Subcatchment have changed so that:
 - All properties have water efficient devices.
 - Potable water consumption has reduced by 20% on 2014 levels.
 - 90% of households are receptive to using recycled water for non-potable uses.
12. 10% of Western Channel Subcatchment properties have rainwater tanks.
13. 10% of Western Channel Subcatchment properties have stormwater infiltration systems.



Rain garden in Marrickville backyard built by community volunteers



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), Western Channel Subcatchment residents are interested in actions that address broader sustainability concerns, e.g. climate change, energy, food production, 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 by linking them to water wherever possible.

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



Pelicans on the Cooks River



Ibis along the Western Channel

Changing Streets for Multiple Goals

Wide streets or wide pavements can be redesigned by extending the nature strip on either side and narrowing the paved area. In the photograph on the left, this would allow for additional stormwater treatment to be incorporated into the streetscape and would improve the look and feel of the area. In the photograph on the right, some of the pavement has been removed and replaced with gardens that help to filter and absorb stormwater.



Left: wide pavements provide opportunities for vegetated garden beds within the streetscape to be designed as a passive irrigation or biofiltration system

Right: an example of pavement being removed and replaced with garden beds to absorb and filter stormwater

GOAL 1

The majority of the Western Channel community is aware of and understands the vision, its goals and the need to better manage water and the environment

GOAL 2

Places of shared learning encourage, support and raise understanding of water management across the generations

Actions

1. Council, the Western Channel Subcatchment Working Group, community and relevant organisations run a *We are all Cooks River People* campaign for the whole WC Subcatchment community* that:
 - a. Identifies key sites and opportunities for:
 - raising awareness of residents and businesses (e.g. at Ferncourt Public School, Alex Trevallion Plaza)
 - shared/peer learning for residents and businesses about green infrastructure and smart technology (e.g. native plants at McNeilly Park and Ruby Street Bush Pocket, new Marrickville Library)
 - b. Targets problematic issues, prioritising littering and dumping
 - c. Promotes the *We are all Cooks River People* curriculum through schools
 - d. Develops civic pride and responsibility for streets and neighbourhoods
 - e. Recognises, supports and promotes existing good practice through current programs and initiatives, e.g. Connecting Marrickville, Target Sustainability at Marrickville, Sustainable Business Awards, garden awards, Sustainability Ambassadors, citizen/volunteer awards

*Community = residents, business people, workers, visitors

GOAL 3

Council and the community have been using a place-based approach for working together to get the best results from our planning, including water, for 8 years

Actions

1. Council and subcatchment stakeholders collaborate to investigate, design and integrate *water-sensitive design and biodiversity with:
 - a. on-ground works, such as roads, footpaths and local area traffic management, identified for the Subcatchment
 - b. flood works identified in the Marrickville Valley Flood Management Plan (once adopted)



**Water-sensitive design - integrating the water cycle into urban design to support ecosystem services to minimise impacts on the environment and improve aesthetic and recreational appeal*



GOAL 4

10% of the Subcatchment area is connected to vegetated stormwater treatment systems

Actions

See Goal 3, action 1

GOAL 5

10% of the Western Channel has been naturalised

Action

Council, the Sydney Water Corporation and the community collaboratively develop and implement a program for naturalising the concrete channels, e.g. at Mackey Park and between railway line and Myrtle Street

GOAL 6

Open areas* in the catchment have been revegetated to increase biodiverse areas by 20% on 2014 levels so diverse native wildlife is a regular sight

Actions

1. Develop program to create habitat networks throughout Murrumbidgee including:
 - a. Mapping current habitat and identify opportunities for networks in public and private space
 - b. Developing a plan for implementation, including sourcing local plant species
 - c. Monitoring the changes over time
2. Collaborate with Railcorp and Sydney Water to develop a program to:
 - a. Rehabilitate the railway easement land with local native species
 - b. Rehabilitate Sydney Water land with local native species
 - c. Agree on a long-term, place-based arrangement for Council and community access and collaboration

(See also Goal 3, Action 1)

**Open areas include parks, gardens (public and private), verges, green roofs and walls, railway and Sydney Water land that is not built on*

GOAL 7

10% of the road reserve area is green space for people and nature

Actions

1. Map road reserves to identify potential green space
2. Prioritise streets to select possible demonstration streets (e.g. wide streets and those with highest need for traffic calming)
3. Collaboratively plan, design, construct and promote a demonstration street with a local interested community
4. Extend and promote the Sustainable Streets program

(See also Goal 3, Action 1)

GOAL 8

A plan is in place to support utility companies to install cables underground to facilitate implementation of water-sensitive urban design and green space for people and nature

Actions

1. Do a broad-scale feasibility study for installing subsurface cables (see Perth example)
2. If feasible, investigate the cost base and develop a business case
3. If 2 supported, collaboratively prepare a plan for a trial project with residents, businesses and utility companies to install their cables underground
4. Seek resources to do the trial project

(See also Goal 3 Action 1 and Goal 7 Actions 2 and 3)



McNeilly Park, Murrumbidgee

GOAL 9

A program is in place for growing food in public and private spaces

Actions

1. Council firstly works with stakeholders to develop local sustainable food guidelines
2. Council, and subcatchment businesses, residents and organisations, including schools, collaborate to pilot sustainable local food production in Western Channel Subcatchment
3. Investigate how to increase shared private spaces, especially medium to high density developments (e.g. through the Marrickville Development Control Plan)

GOAL 10

Demonstration sites in or near Western Channel Subcatchment provide diverse examples of shared spaces, green infrastructure and smart technology

Actions

1. Provide inspiring and accessible information on sustainable urban design by promoting:
 - a. the Sustainability Ambassadors program
 - b. Council's best practice projects and infrastructure
 - c. the Sustainable Business program (Target Sustainability at Marrickville businesses)
2. Revise Council's DCP to include best practice green infrastructure and smart technology

(See also Goal 1, Action 1a)

GOAL 11

Water consumption practices in the Western Channel have changed so that:

- a. All properties have water efficient devices
- b. Potable water consumption has reduced by 20% on 2014 levels
- c. 90% of households are receptive to using recycled water for non-potable uses

Actions

1. Council reviews, continues to run and promote the Waterevolution Urban Water Education Program on:
 - a. efficient water use
 - b. rainwater harvesting
 - c. greywater reuse
 - d. drought tolerant gardens
2. Administer the community water survey to show the changes in water use behaviour

(See also Goal 9 Action 1a and b)



Bruce Street rain garden, community planting day 2014

GOAL 12

10% of properties have rainwater tanks

Actions

1. Council promotes incentive scheme for sustainable water management:
 - a. review and promote the rainwater tank incentive scheme
 - b. Investigate neighbourhood scale rainwater harvesting and/or aquifer recharge:
 - i. Conduct feasibility study
 - ii. Run a pilot program (if feasible)

(See also Goal 9 Action 1a and b)

GOAL 13

10% of properties have infiltration systems, e.g. rain gardens, swales, wetlands

Actions

1. Do a technical feasibility study that:
 - a. includes soil investigations
 - b. informs trial/demonstration sites for monitoring
2. Investigate rebate program for rain gardens and other water sensitive design
3. Develop guidelines suitable for households and businesses
4. Establish a volunteer rain garden building collective
5. Review and promote the WSUD on Your Property workshops to support a rebate program

(Also see Goal 12, Action 1)

Development of Options

Treatment

Potential on-ground works to treat runoff were developed to meet the Western Channel goals. Sites for treatment were selected by:

- looking at opportunities and site constraints, and
- working out potential pollution reductions in stormwater runoff going to the Cooks River

Flooding

Flood management works recommended in the Marrickville Valley Flood Management Plan will be added to this plan when that project is finalised.

Funding

The identified works will be incorporated into infrastructure design works for renewal. The proposed works will be scheduled based on Council's asset management plans and budgeted in Council's Long Term Financial Plan.

Works will be funded by the Marrickville Stormwater Charge and grants as they become available. They will also be integrated with the Connecting Marrickville capital works program as opportunities arise.

Streetscapes

More than 30% of the impervious area in the catchment is in road reserves. Furthermore, roads contribute higher suspended solids and phosphorus loads than other surfaces. Therefore, the streetscape is a key area to focus efforts at reducing stormwater runoff and improving stormwater quality.

Road reserve areas contribute:

- 14 hectares of road area
- 5.7 hectares of other impervious area
- 202 megalitres/year runoff (29% of total subcatchment runoff)
- 87 tonnes/year TSS (56% of total subcatchment load)
- 166 kilograms/year TP (55% of total subcatchment load)
- 645 kilograms/year TN (28% of total subcatchment load)

(TSS - total suspended solids; TP - total phosphorus; TN - total nitrogen)

Proportion of types of road reserve.

Road Reserves	Area (ha)
Major road	3.1
Industrial street	0.2
Residential - wide streets	11.7
Residential - narrow streets	3.3
Lane	2.7
Total	21

There are two broad types of opportunities in streetscapes:

1. Reducing impervious area by replacing either roadway or footpath pavement with pervious materials/vegetated areas
2. Building rain gardens into the streetscape to capture runoff for treatment before it reaches the stormwater system

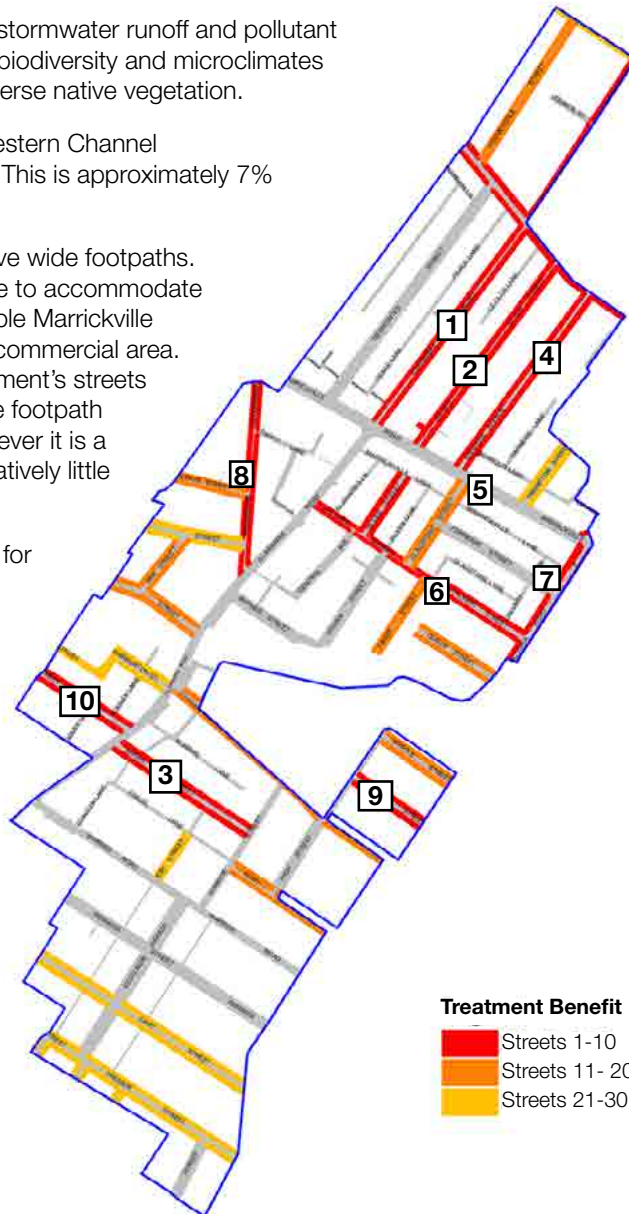
4.1 Greening wide footpaths

Reducing paved areas reduces stormwater runoff and pollutant loads but has other benefits for biodiversity and microclimates especially when planted with diverse native vegetation.

The total area of footpaths in Western Channel Subcatchment is about 5.6 ha. This is approximately 7% of the Subcatchment area.

Many of Marrickville's streets have wide footpaths. Some footpaths need to be wide to accommodate high pedestrian traffic, for example Marrickville Road and Illawarra Road in the commercial area. However, most of the Subcatchment's streets are residential. For example, the footpath in Ann Street is 3.4m wide, however it is a residential street and there is relatively little pedestrian traffic.

There is no standard path width for a residential street, but a typical minimum width in the area is around 1.5 m. A few footpaths are narrower than this.



Treatment Benefit
■ Streets 1-10
■ Streets 11-20
■ Streets 21-30

	Street	Now	Potential future scenario with 1.5m wide footpaths	
		Total footpath area (sqm)	Total footpath area (sqm)	Reduction in area (cumulative) (sqm)
1	Illawarra Road	2,339	1,244	1,096
2	Silver Street	2,202	1,157	2,141
3	Grove Street	1,659	710	3,090
4	Garners Avenue	1,772	946	3,916
5	Sydenham Road	1,191	503	4,604
6	Calvert Street	1,246	672	5,178
7	Victoria Road	892	391	5,679
8	Petersham Road	1,135	644	6,170
9	Harriet Street	882	395	6,658
10	Greenbank Street	812	351	7,119

If the top 10 streets are modified to reduce the footpath width to 1.5 m, The table above shows that an estimated 7,100 square metres of footpath area could be converted to pervious area. If all 30 of the high priority streets are modified, an estimated 11,600 square metres (1.16ha) would be converted.

Footpaths converted	Area depaved (ha)	Reduction in stormwater flows (ML/year)	Reduction in TSS loads (tonnes/year)	Reduction in TP loads (kg/year)	Reduction in TN loads (kg/year)
Top 10 streets	0.71	4.8	1.9	2.8	18.9
Top 20 streets	1.03	7.0	2.8	4.0	27.5
Top 30 streets	1.16	7.8	3.1	4.5	30.8

A simple cost estimate was undertaken for footpath greening. Costs were estimated at:

- \$170/sqm for concrete removal
- \$50/sqm for laying topsoil and turf

Cost /benefit for footpath greening

WSUD measure	Cost	TN removal (annual)	TN removal (25 years)	Cost per kg TN
Footpath greening	\$220/sqm	2.66 x 10 ⁻³ kg per year per m ²	0.066kg/m ²	\$3,300

4.2 Greening laneways

The total area of laneways in Western Channel Subcatchment has been estimated as 2.65ha and are typically 100% paved.

The key constraints that need to be considered for WSUD in laneways are:

- Most laneways require some form of vehicle access
- Some laneways may also require access for rubbish collection
- Most have no (or only very shallow) stormwater drainage systems

Therefore the most significant opportunities in laneways involve simple measures to reduce impervious area and increase pervious surfaces, such as:

- Introducing vegetated strips along each edge of the lane and/or along the centre. This should be the first priority for lanes wherever possible.
- Re-paving with permeable materials (noting that permeable paving is most useful when the subgrade is relatively pervious, or where a pervious subgrade can be laid – permeable paving will have a limited benefit when the subgrade comprises compacted clays)

In some cases where a shallow stormwater drainage system is available, it will allow a pervious subgrade to be laid beneath permeable paving, with filtered flows directed to the stormwater drainage system.

In terms of prioritising lanes for greening within Western Channel Subcatchment, social, landscape and amenity considerations should be given equal weight with physical characteristics. The recommended lanes to consider first are summarised in Table 10.

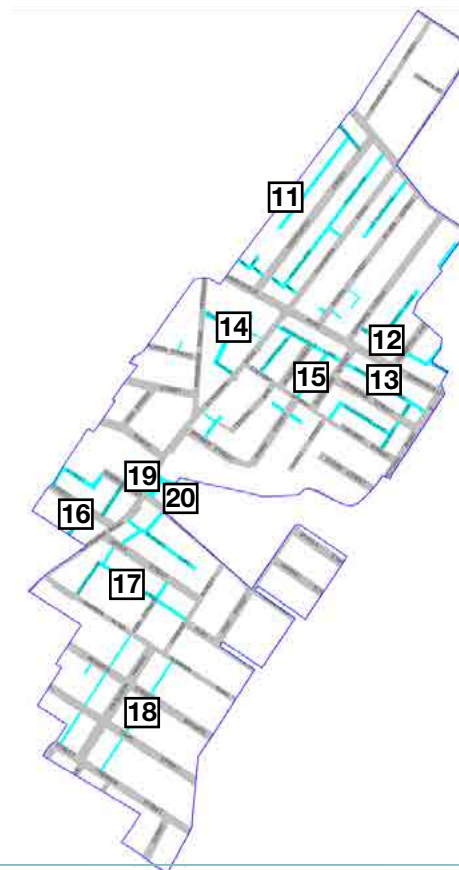
Proportion of WC laneways converted to pervious surfaces	Reductions in stormwater flows and pollutant loads			
	Flow	TSS	TP	TN
	ML/year	tonnes/year	kg/year	kg/year
25%	4.5	2.9	5.8	14.1
50%	8.9	5.8	11.6	28.1
75%	13.4	8.7	17.5	42.2
100%	17.8	11.6	23.3	56.3

TSS - total suspended solids TP- total phosphorus TN - total nitrogen

Lanes identified as dumping hot spots		Lanes likely to form useful walking/cycling routes		Lanes with potential significant benefit in improving amenity	
11	Convent Lane	13	Marrickville Lane (potential cycling route parallel to Marrickville Road)	19	Warburton Street (forms one of the edges to McNeilly Park)
12	Seymours Lane			20	Station Street (however this will form part of proposed Marrickville Station area redevelopment)
13	Marrickville Lane	18	Johnston Lane (potential walking route to Ferncourt Public School)		
14	Tuohy Lane				
15	Silver Lane				
16	Wooley Lane				
17	Frede Lane				
18	Johnston Lane				



Marrickville Lane



4.2 Greening wide roads

Each of the wide streets in Western Channel Subcatchment has been assessed for the potential to reduce the road width with the top 13 streets summarised in the table below. These streets are relatively unconstrained (e.g. no angle parking, in-road planting, cycleways, etc), ranked in terms for potential pavement area reduction within the Subcatchment.

	Suitable streets	Area reduction (sqm) if road width reduced to 9.6m	Reductions in stormwater flows and pollutant loads			
			Flow	TSS	TP	TN
			ML/year	tonnes/year	kg/year	kg/year
21	Renwick Street	1,070	0.7	0.5	0.9	2.3
22	Cary Street	1,018	0.7	0.4	0.9	2.2
23	Premier Street	907	0.6	0.4	0.8	1.9
24	Grove Street	745	0.5	0.3	0.7	1.6
25	Queen Street*	479	0.3	0.5	0.4	1.0
26	Greenbank Street	437	0.3	0.2	0.4	0.9
27	Harriet Street	381	0.3	0.2	0.3	0.8
28	Francis Street	343	0.2	0.2	0.3	0.7
29	Thornley Street	258	0.2	0.1	0.2	0.5
30	Charlotte Avenue	257	0.2	0.1	0.2	0.5
31	Ann Street	250	0.2	0.1	0.2	0.5
32	Mansion Street	81	0.1	0.0	0.1	0.2
33	Richards Avenue	42	0.0	0.0	0.0	0.4
Total		6,267	4.2	2.9	5.5	13.3

*Pavement width of 10m allowed to accommodate dividing wall
TSS - total suspended solids TP- total phosphorus TN - total nitrogen

A simple cost benefit analysis was taken to measure the benefit of greening wide roads. Costs were estimated at:

- \$100/sqm for demolition and disposal
- \$110/sqm for reconstructing new kerb and gutter
- \$80/sqm for filling old road area up to verge level and laying topsoil and turf

Cost /benefit for greening wide roads

WSUD measure	Cost	TN removal (annual)	TN removal (25 years)	Cost per kg TN
Greening wide roads	\$290/sqm	2.66 x 10 ⁻³ kg per year per m ²	0.066kg/m ²	\$5,400

High priority streets for reducing pavement widths



4.4 Rain gardens

Opportunities for streetscape rain gardens have been investigated in Western Channel Subcatchment at all of the locations where streets have underground stormwater systems.

Where preliminary analysis indicated that rain gardens could be feasible, further analysis was done to check the rain garden area for potential connections with other works.

The top five rain garden sites are places where a reasonable sized rain garden can be built that is not overly complex or needing to be coordinated with other works.

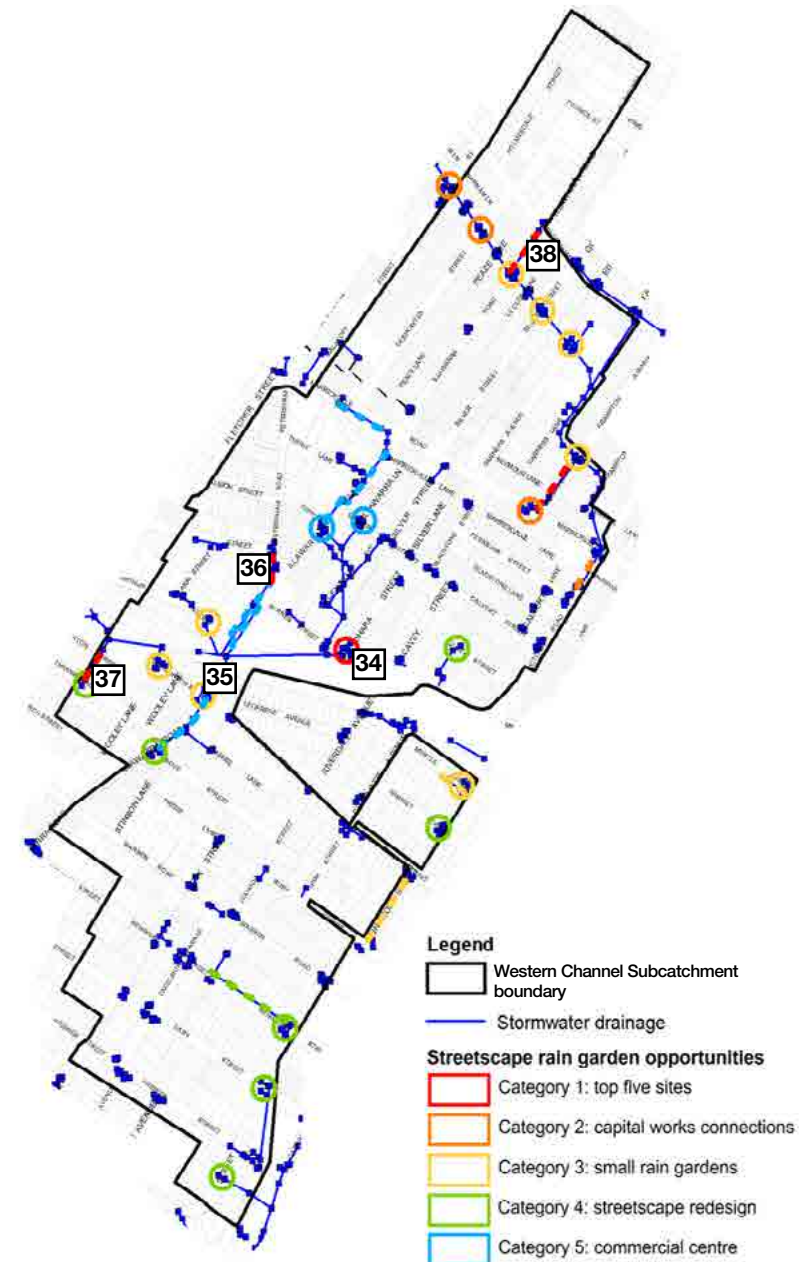
Top five streetscape rain garden sites (Category 1 on map)

The top five rain garden sites are places where a reasonable sized rain garden can be built that is not overly complex or needing to be coordinated with other works.

	Location	Approx. potential rain garden area (sqm)	Approx. potential filter area (sqm)	Catchment area (ha)	Cost estimate	TN removal (kg/year)	Simple cost per kg TN over 25 years
34	Cnr. O'Hara and Byrnes Sts	60	30	0.6	\$50,000	4.8	\$420
35	Warburton St (various locations)	60	40	1.03	\$58,000	7.1	\$330
36	Petersham Rd (from Illawarra Rd and Francis St)	30	20	1.71	\$41,000	3.9	\$420
37	Unnamed lane between Greenbank St and McNeilly Park	72	48	1.81	\$63,000	9.8	\$260
38	Illawarra Rd (from Sydenham Road to Western Channel)	39	26	0.24	\$46,000	3.0	\$610



Corner of O'Hara St and Byrnes St (from O'Hara St Playground)



Good rain garden sites connected with other capital works (Category 2 on map)

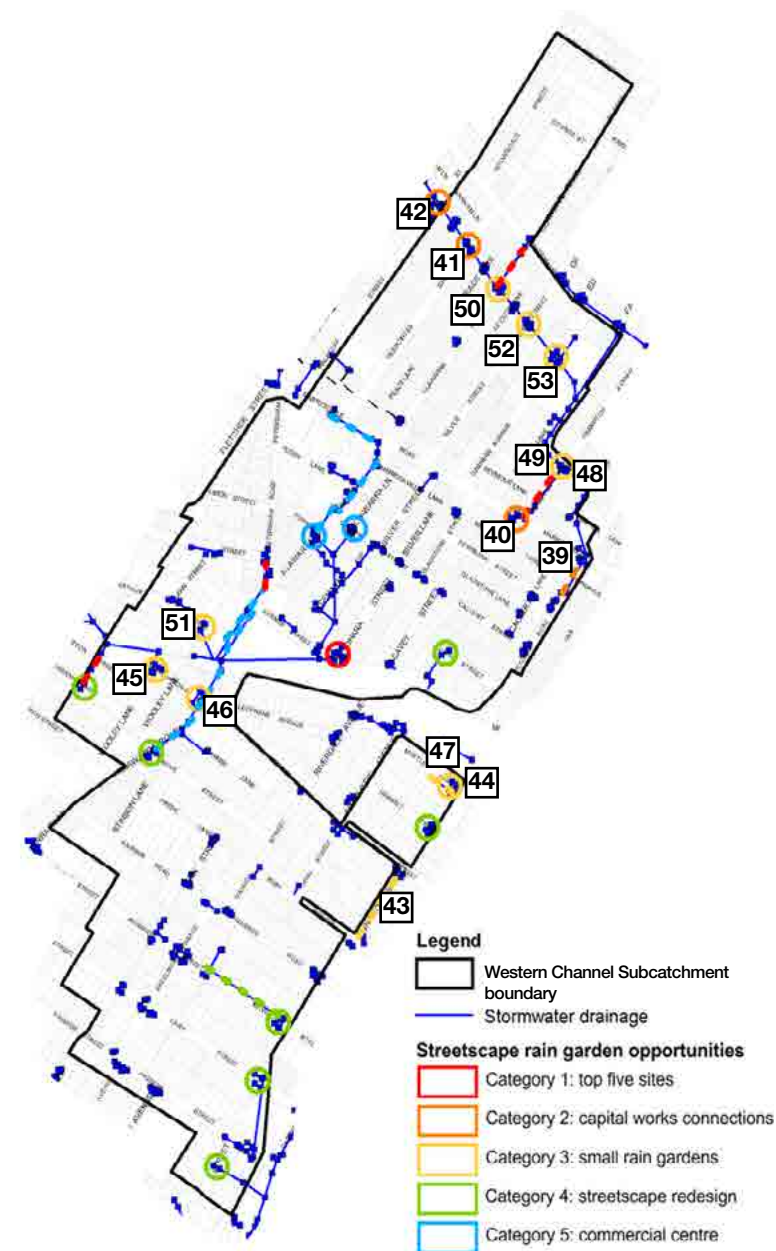
These rain gardens are expected to be feasible especially if coordinated during other capital works such as stormwater system upgrades.

	Location	Comments
39	Victoria Rd (from Marrickville Lane to Marrickville Rd)	Stormwater system upgrade/local area traffic management (LATM)
40	Marrickville Rd near Frampton Ave	LATM: proposed pedestrian crossing
41	Malakoff Street at Western Channel crossing	LATM: proposed angle parking (east side)
42	Despointes St at Western Channel crossing	LATM: proposed angle parking (west side)

Sites with potential for small rain gardens (Category 3 on map)

These are areas with significant constraints such as driveways and trees, but rain gardens can be accommodated between these features. These are likely to be more expensive to construct.

	Location	Comments
43	Junction Street	Could place a series of small rain gardens. Western Channel runs under the street. Constrained by driveways/street trees
44	Myrtle St, Nos 16-20	Could place a series of small rain gardens. Constrained by driveways and street trees
45	Warburton St, park end	Potential rain garden on southern side of street in no parking area, and on northern footpath
46	Warburton/llawarra/Schwebel intersection	No parking area is best opportunity
47	Myrtle St (northern side) at Western Channel	Potential for small rain garden if one tree is removed
48	Frampton Ave at Western Channel	Potential for small rain garden if one tree is removed
49	Frampton Ave, Marrickville Rd to car park entry	Potential for small rain garden in footpath in front of Nos. 52 to 56
50	llawarra Rd at Western Channel	Good site in front of No. 173
51	Arthur Street low point	Space for a couple of very small footpath rain gardens
52	Silver Street at Western Channel	Potential for small system in front of No. 7 or 9
53	Garners Ave at Western Channel	Potential for small system in front of No. 20



Sites where the streetscape could be redesigned to accommodate larger rain gardens (Category 4 on map)

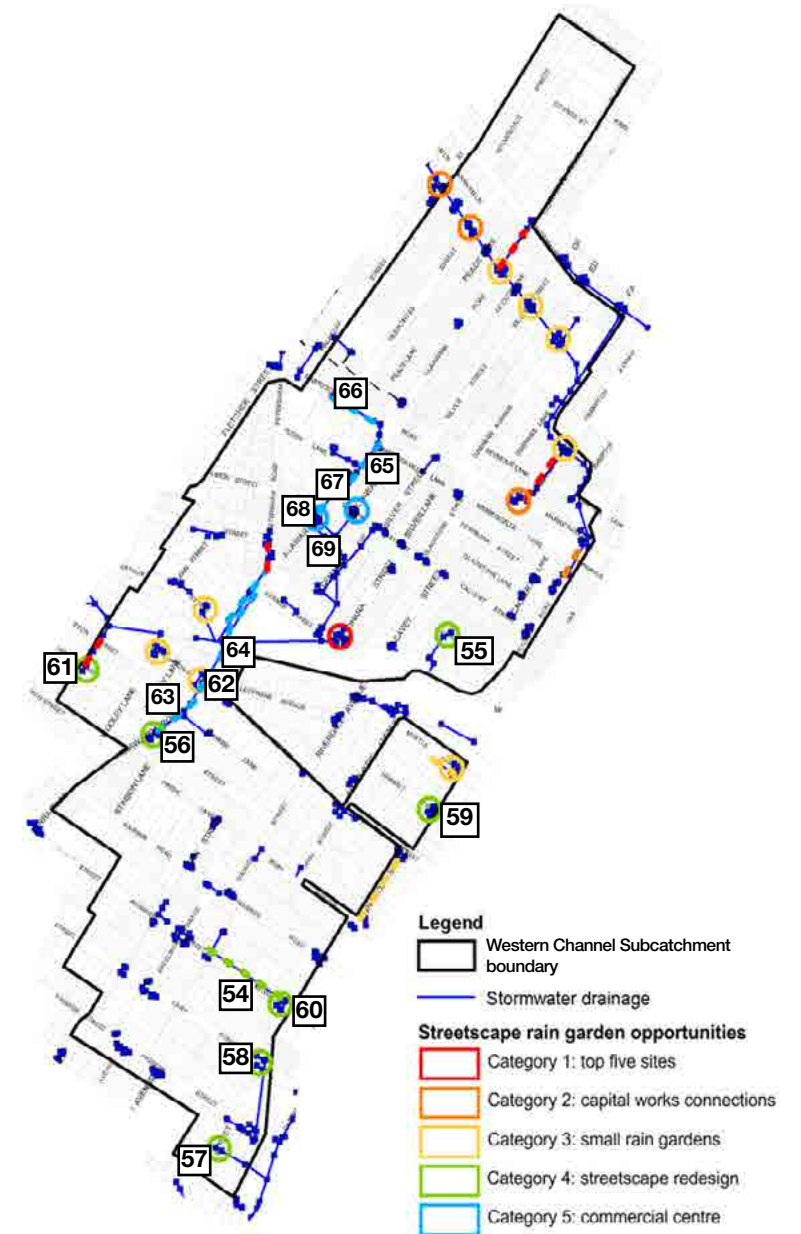
Although some of these sites could accommodate small rain gardens now, they are located in wide street that would benefit from further investigation into design options for extending rain gardens into the roadway.

	Location	Comments
54	Renwick St, at 41-79	Potential sites for rain gardens during streetscape upgrade
55	Queen St at low point	
56	Grove St, Illawarra Rd end	
57	Thornley St, at 75/100	
58	Cary St at WC	
59	Harriet St at WC	
60	Renwick St at WC	
61	Greenbank St at unnamed Ln	

Sites within the commercial centre (Category 5 on map)

Works at these sites are best included during public domain upgrade works

	Location	Comments
62	Station St - below Illawarra Rd	Potential rain garden, subject to station upgrade
63	Illawarra Rd south of station	Opportunities include:
64	Illawarra Rd at Revolution development	• Tree pit bioretention systems
65	Illawarra Rd - Marrickville Lane to Calvert St	• Small rain gardens where space allows
66	Marrickville Rd - Illawarra Rd to Despointes St	
67	Illawarra Rd near Touhy Lane	
68	Illawarra Rd - Touhy Lane to Calvert St	
69	Calvert St at Illawarra Lane	



4.5 Opportunities in public open space

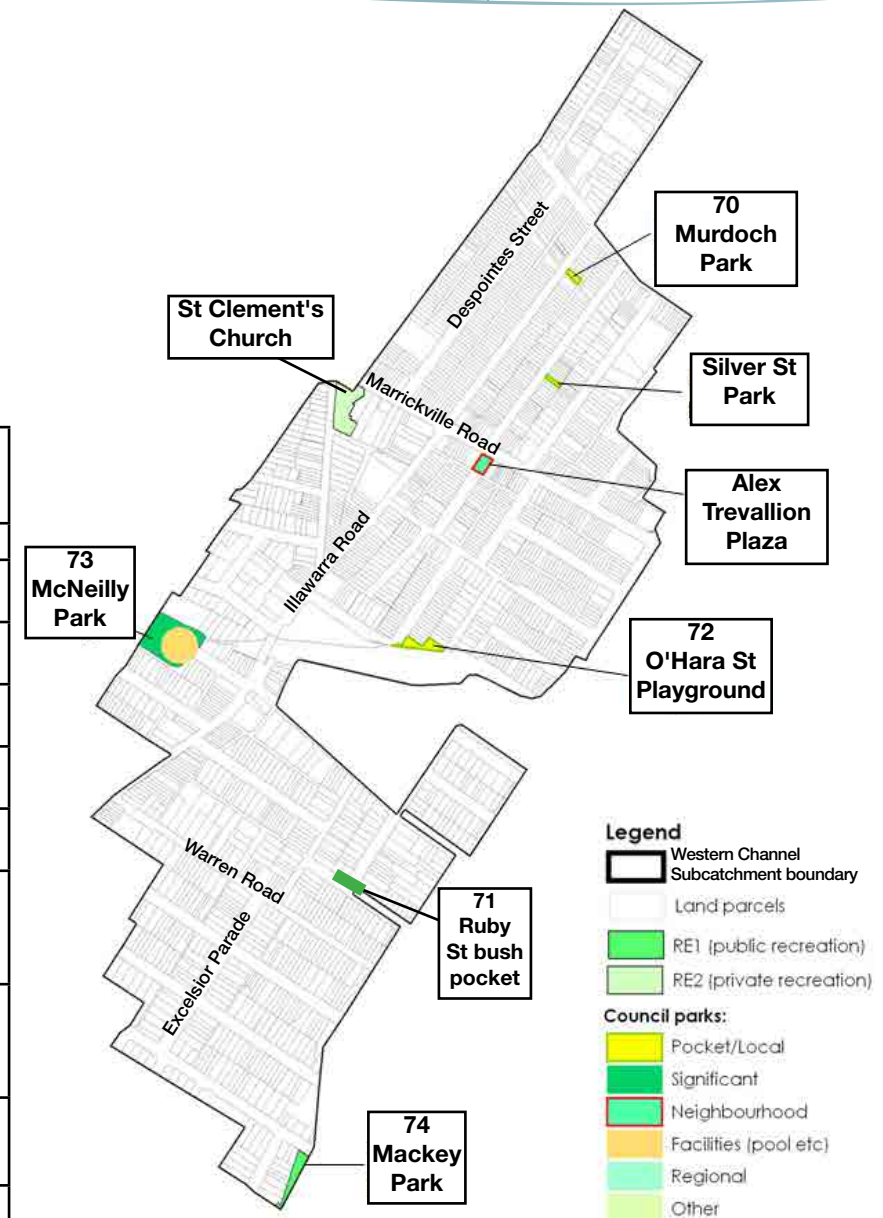
Only 1.4% of the Subcatchment area (1.2ha) is zoned as open space. Most of this is public parkland. The Ruby Street bush pocket has recently been rezoned as open space.

There are opportunities in parks and other public open space for small rain gardens and/or wetlands, particularly where these can be combined with other works or address other issues at the site such as:

- Stormwater-related erosion
- Hots spots for litter accumulation
- Locations with opportunities for more native planting

Stormwater treatment opportunities in public open space

	Park	Options	Treatment area (sqm)	Catchment area (sqm)	Cost estimate	TN removal (kg/year)	Simple cost/ kg TN over 25 years
70	Murdoch Park	Rain garden	10	0.19	\$23,000	1.6	\$560
71	Ruby St bush pocket	Rain garden	45	0.39	\$60,000	4.8	\$500
72	O'Hara St Playground	(a) Rain Garden in O'Hara St	30	0.60	\$50,000	4.8	\$420
		(b1) Rain Garden at eastern end of park	60	0.47	\$99,000	6.6	\$600
		(B2) Rain garden at eastern end of park	60	0.47	\$128,000	6.6	\$740
		(B3) Rain garden at eastern end of park	110	0.99	\$140,000	12.7	\$440
73	McNeilly Park	(a) Rain garden at eastern end of park (treating part of WC subcatchment)	90	2.17	\$100,000+	14.9	\$270+
		(b) Rain garden at eastern end of park (treating part of Malakoff subcatchment)	This option has not been scoped up but should be investigated as an alternative to (a) with a better design outcome. Therefore, funding has yet been nominated in Council's Long Term Financial Plan.				
		Rain gardens in laneway between park and Greenbank Avenue	48	1.81	\$63,000	9.8	\$260
74	Mackey Park	(a) Bioretention system	190	1.9	\$130,000	22.8	\$230
		(b) Modification of existing wetland	This option requires further investigation and feasibility assessment. Therefore, no funding has yet been nominated in Council's Long Term Financial Plan.				



4.6 Other opportunities

Channel Naturalisation

The main open channel in the Subcatchment is the Western Channel itself. Its alignment is shown on the map on the right. The map also shows the open sections, and covered sections.

The best opportunities for channel naturalisation are within Mackey Park and near Myrtle Street. The covered section in Frampton Avenue car park may also be worth considering as the car park is underutilised.

Any further development of these options would require discussion with Sydney Water.



Western Channel alignment
 Stormwater Channel
 - - - - - Underground channel
 ——— Open channel
 □ Western channel catchment

Channel Sections	Type	Length (m)	% of total
Upstream residential	Open	261	13%
Private property (Garners Ave)	Covered	77	4%
Frampton Ave car park	Covered	203	10%
Under Victoria Rd	Covered	511	25%
Railway line to Myrtle St	Open	62	3%
Edge of Carrington Rd	Open	458	22%
	Covered	286	14%
Mackey Park	Open	118	6%
Miscellaneous	Covered	79	4%

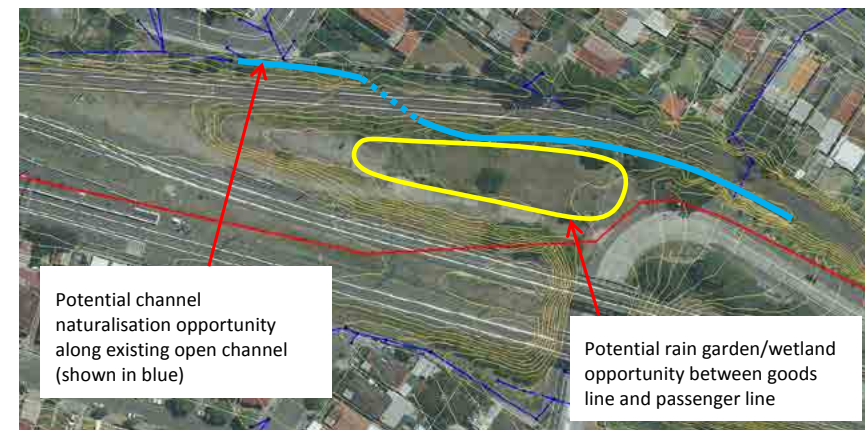
Railway Lands

There is a significant area of railway land with the Subcatchment - approximately 2.6ha (3.2%) of the catchment. The railway land is aligned with a natural drainage depression and therefore significant volumes of stormwater pass through this area. There is an open Sydney Water channel that runs between O'Hara Street and Victoria Road.

As shown in the aerial photos below, there are spaces within the railway corridor that may provide potential opportunities for stormwater management. Any further development of these options would require discussion with Transport for NSW.



Above: Potential stormwater treatment sites on railway land to the west of Marrickville Station



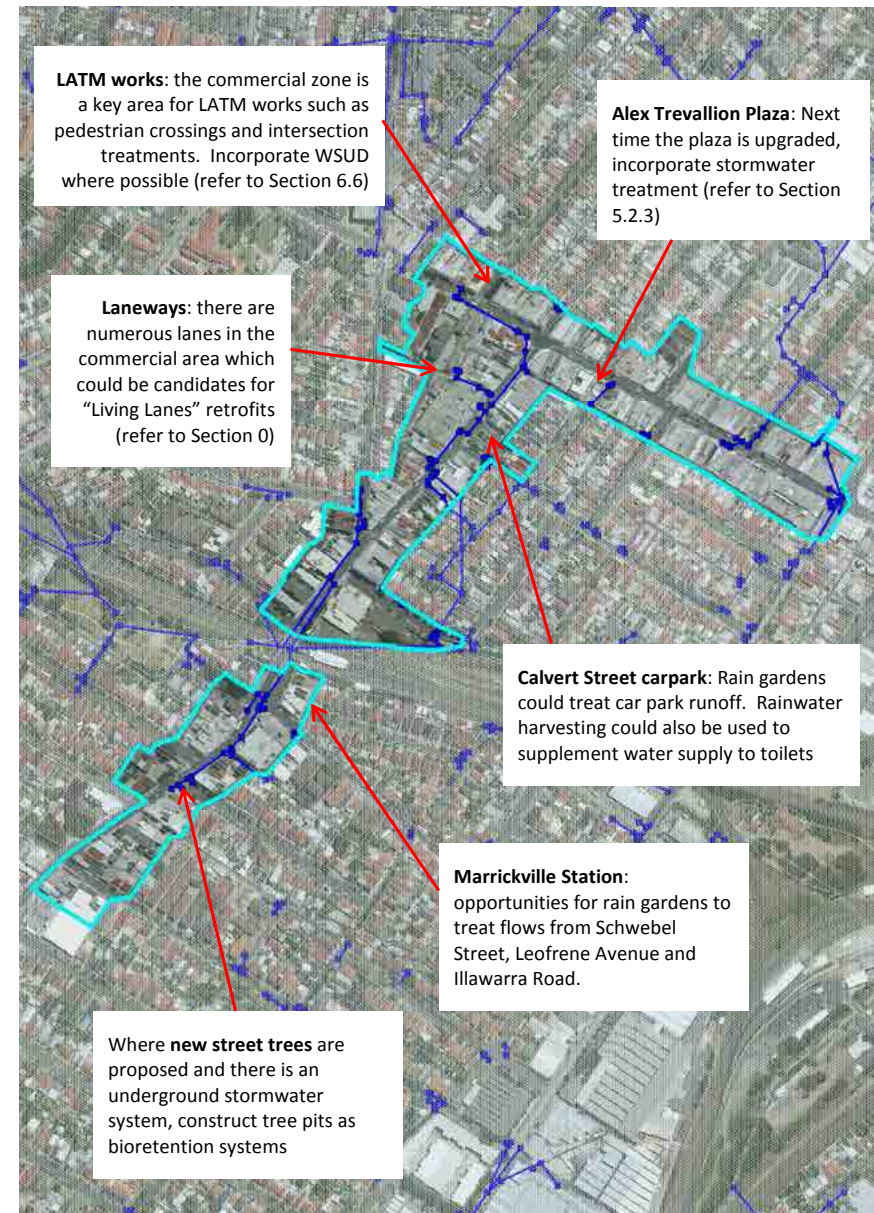
Above: Potential stormwater treatment sites on railway land to the east of Marrickville Station

The Commercial Centre

The commercial centre along Marrickville Road and Illawarra Road present some unique opportunities for water sensitive urban design:

- Much of this area is expected to undergo significant redevelopment in the coming years
- The commercial zone is due for a significant streetscape upgrade over the next few years
- There are significant public sites due for upgrade, including Marrickville Station and surrounds
- The area has high volumes of pedestrian traffic therefore:
 - WSUD in this area is highly visible to the community and so provides opportunities for demonstration sites
 - High quality materials and finishes are expected therefore budgets may accommodate WSUD more readily than those for quieter residential streets
- The stormwater network is more extensive in this area providing more opportunities for bioretention systems

Water sensitive urban design needs to be integrated into future upgrades and therefore opportunities worth further investigation are being identified at this stage. These opportunities are summarised on the map on the right.



Above: Potential stormwater treatment sites in commercial areas in Western Channel Subcatchment

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.
Biofiltration	The use of vegetation and natural materials (including bacteria) to trap and remove pollutants. Examples include rain gardens, bioretention systems and constructed wetlands.
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.
Bioretention	A system that uses vegetation to treat stormwater and reduce downstream stormwater flow velocities and subsequent drain sizes.
Botany Bay Water Quality Improvement Program (BBQIP)	Managed by the Greater Sydney Local Land Service, the BBQIP has developed draft water quality objectives and load targets needed to protect the draft environmental objectives. Web site: http://www.sydney.cma.nsw.gov.au/bbccii/
CALD community	People from culturally and linguistically diverse backgrounds.
Capacity building (organisational)	The development of skills, management practices, strategies, and systems to improve an organisation's effectiveness, sustainability and ability to fulfil its vision and objectives.
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.
Connecting Marrickville	Council initiative to use place-based planning to integrate capital works with WSUD and improved urban streetscapes.
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.

Term	Meaning in Subcatchment Planning
Ecosystem services	The multitude of complex interactions among living and non-living components of the environment that provide resources and processes that support and enrich life.
Evapo-transpiration	The loss of water from the soil, water surface and plants by evaporation to the atmosphere.
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.
Green infrastructure	Green spaces and water systems that deliver multiple environmental, economic and social values and benefits. Includes parks, gardens, waterways, wetlands, green roofs and walls, sports fields and cemeteries.
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.
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.
Modeling	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.

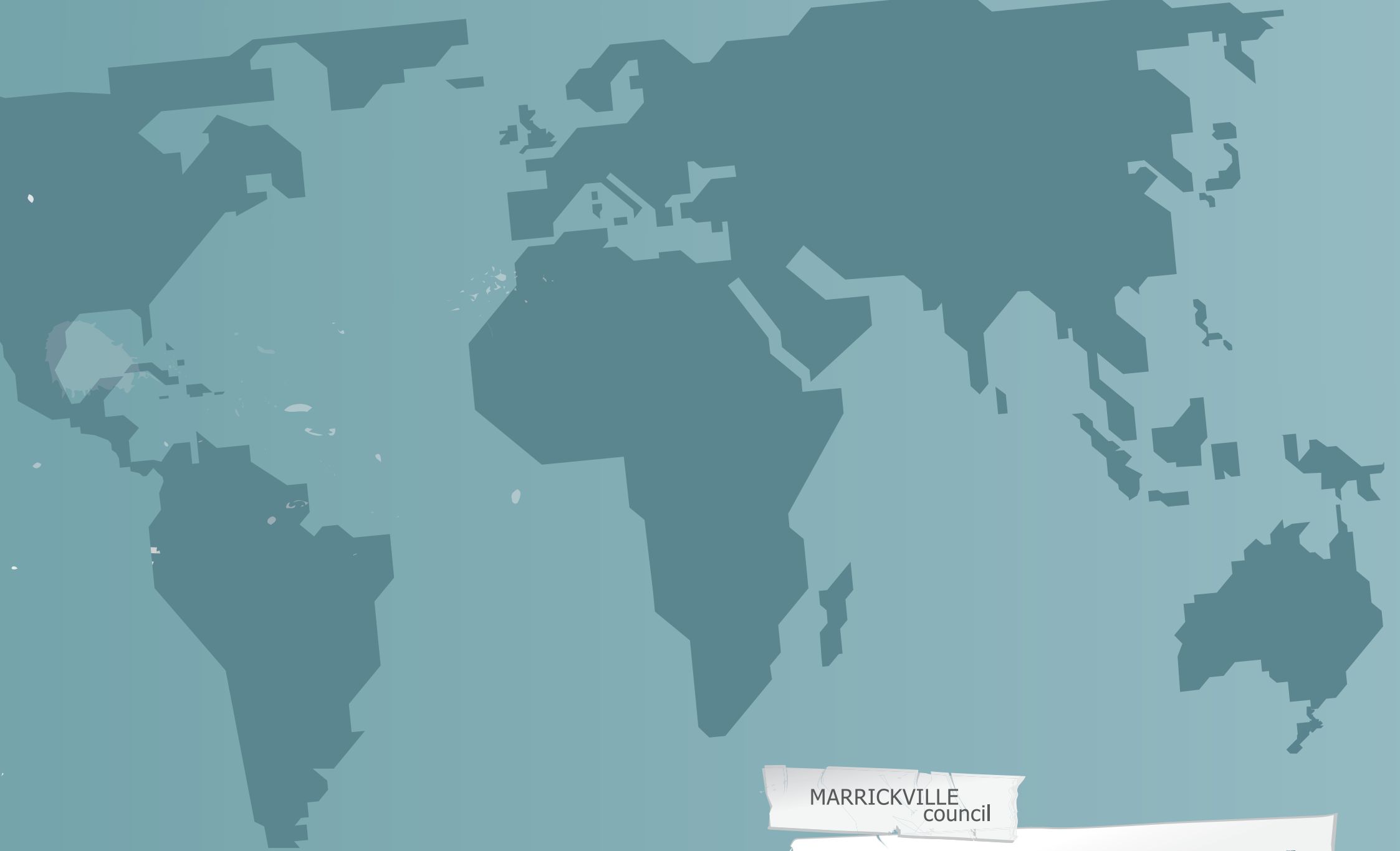
5. Glossary



Term	Meaning in Subcatchment Planning
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.
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.
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 modeling 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 rainfall events to infiltrate the soil.
Runoff	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.
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 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 identifying 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).
Sustainable urban water management (SUWM)	The integration of social, economic and environmental aspects to planning and management of water, with the aim to minimise use of other resources, such as energy.

Term	Meaning in Subcatchment Planning
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 area's 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 accumulates 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.

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