Eastern Channel East Subcatchment Management Plan 2011

MARRICKVILLE council

WATER3VOLUTION

Funded by the Marrickville community through the Stormwater Charge

OurRiver

cooks river sustainability initiative

NSW Environmental TRUST

COOKS RIVER FORESHORES

Contents

Acknowledgements

The Eastern Channel East Subcatchment Plan was prepared in 2011 by *OurRiver - Cooks River Sustainability Initiative* and Marrickville Council, who would like to acknowledge contributions made by the EC East Subcatchment residents, St Peters Public School, Camdenville Public School, Enmore TAFE, Monash University, Sydney Water Corporation, Sydney Metro CMA and other stakeholders who participated in interviews, meetings and workshops, and provided valued information and support along the way.

Front cover: Croquet and archery on the grounds of Enmore House, Enmore Road, Newtown [ca. 1865-1870]. Used with permission of the State Library of NSW.

Eastern Channel East Subcatchment 2050 Vision

MARRICKVILLE council
WATER3VOLUTION
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In 2050, we are happy, recognise our dependence on natural systems and we value water. We have a profound sense of achievement with respect to the changes to our subcatchment and lifestyles. We are leaders in sustainable practice and innovative design. Our society is active and engaged, and collaborative processes have influence beyond the subcatchment.

In 2050, a holistic approach is taken in the design, maintenance and improvement of the local natural and built environment. All new development is considerate of future generations, and water sensitive technologies are familiar, affordable and widely used.

Our waterways, wetlands and green spaces are thriving urban ecosystems that support cultural activities, recreation or local food production.

South King Street, Newtown (OurRiver).

EC East Subcatchment railway corridor, St Peters (OurRiver).

Eastern Channel East Subcatchment aerial map, 2007.

1. Planning the Eastern Channel East Subcatchment

1.1 Background to subcatchment planning

Marrickville Council is aiming to make the Marrickville local government area a *water sensitive city* and is developing a water strategy for 2011 to 2021 that will set out the ways Council intends to get there.

Through the *Waterevolution* 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 each of the 21 subcatchments in the Marrickville local government area.

Collaborative and integrated planning approach

The *Waterevolution* 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 applying the principles of sustainable water management and best practice governance (see box right) that will 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, 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 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 for sustainable urban water management. 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, and Riverside Crescent Subcatchment Plan in 2010. The Eastern Channel East Subcatchment (EC East) is the fourth to have a management plan. The subcatchment plans are reviewed annually to track progress and have a major review every five years by Council and subcatchment stakeholders, including the subcatchment working groups.

Water Sensitive City

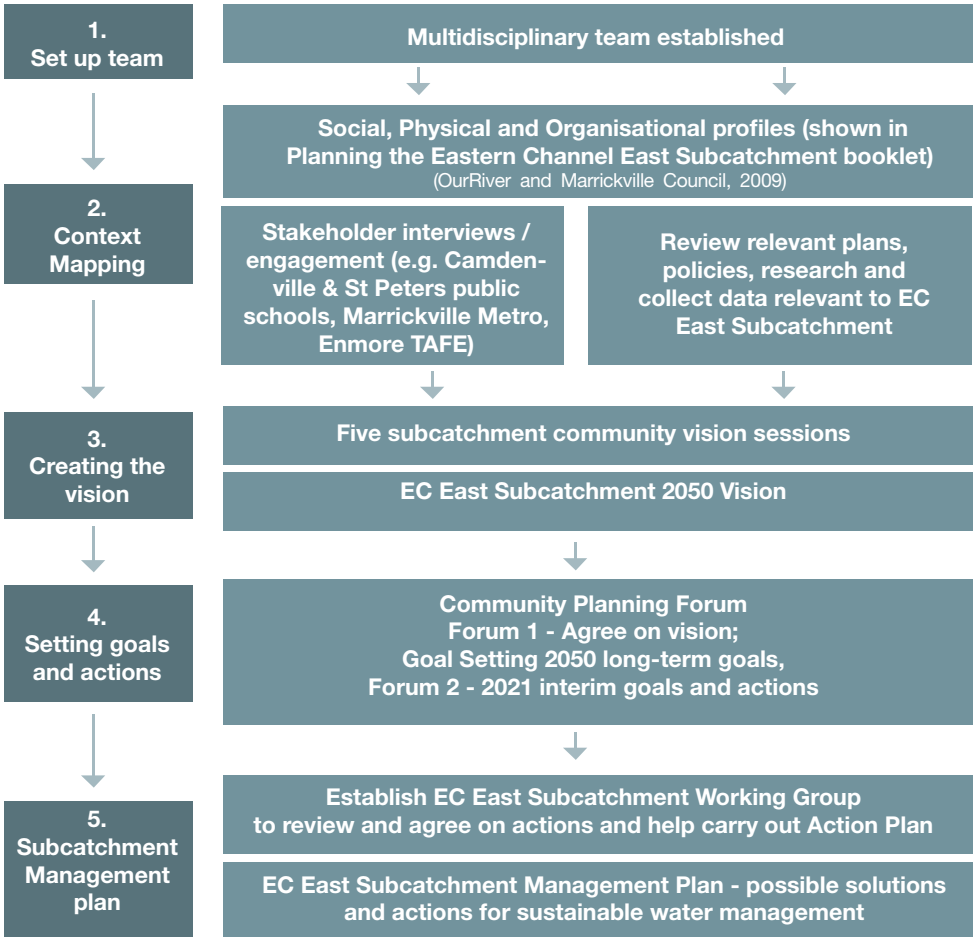
A *Water Sensitive City* has a range of water sources. Its water infrastructure also benefits the environment and helps cope with the effects of climate change. People, business, and governments work well together and support an ecologically sustainable lifestyle. (Adapted from Wong and Brown, 2009).

Principles of sustainable urban water management:	Best practice governance:
1. Improve the quality of stormwater entering waterways	1. Work with the people who live and work in the area
2. Reduce the amount of stormwater entering drains and waterways	2. Improve the ability of Council, other governments and land managers to manage water sustainably, e.g., develop skills, collect and share data better learn from evaluation
3. Reduce impacts of flooding	3. Integrate planning and projects
4. Use water that is fit for its purpose e.g., recycled water for irrigation	4. Communicate progress and results to all stakeholders

Principles of sustainable urban water management and best practice governance (Brown, 2008).

1.2 How we planned EC East Subcatchment

Planning the EC East subcatchment was done in partnership with the *OurRiver - Cooks River Sustainability Initiative* (OurRiver, 2011). This partnership of eight councils (Ashfield, Bankstown, City of Canterbury, City of Sydney, Hurstville, Marrickville, Rockdale and Strathfield) is a Cooks River Foreshore Working Group initiative, funded by the NSW Environment Trust from 2007 to 2011. Its aim is to improve the health of the Cooks River, facilitate a catchment-wide shift to sustainable urban water management, and to establish a catchment-wide alliance to support the continued rehabilitation of the Cooks River.



Collaborative planning process in EC East Subcatchment.

Collaborative planning

To create the *Draft Eastern Channel East Subcatchment Plan*, (Draft 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. EC East is the first subcatchment to integrate floodplain management with stormwater quality management and reuse opportunities through Council's collaborative planning process.

1. Multidisciplinary team

The multidisciplinary team of OurRiver, 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 EC East Subcatchment's history, community make up, water cycle, and the other details shown in Section 2.

The physical profiling included the subcatchment flood study (Golder Associates, 2010) 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 Eastern Channel East Subcatchment* information booklet (2009) that was given to all who took part in the planning process. Everyone then had 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 include:

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

Major land managers, water users and decision makers, such as Marrickville Metro, and Camdenville and St Peters public schools, 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 and businesses in the EC East Subcatchment were invited to vision sessions in March and April 2009. *The Eastern Channel East Subcatchment 2050 Vision* results from the ideas from 5 vision sessions that included students from Camdenville and St Peters public schools. Representing community desires, it is the reference point for planning the EC East Subcatchment.

4. Setting Goals and Actions

The community vision was the basis of the May 2009 planning forum. At the forum, residents, Council, Sydney Water Corporation, school principals, and the then Department of Environment, Climate Change, and Water developed goals and possible actions to reach the 2050 vision.

5. EC East Subcatchment Management Plan

The EC East Subcatchment planning is the first to plan and integrate flood management with stormwater quality and reuse. The Draft Plan includes the subcatchment vision, goals and the action plan in Section 3. Recommendations for stormwater treatment, harvesting and flood management projects (Golder Associates 2010, 2011) are outlined in Section 4.

EC East Subcatchment Working Group

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

EC East Community Vision Session, 2009.

EC East Community Vision Session, 2009.

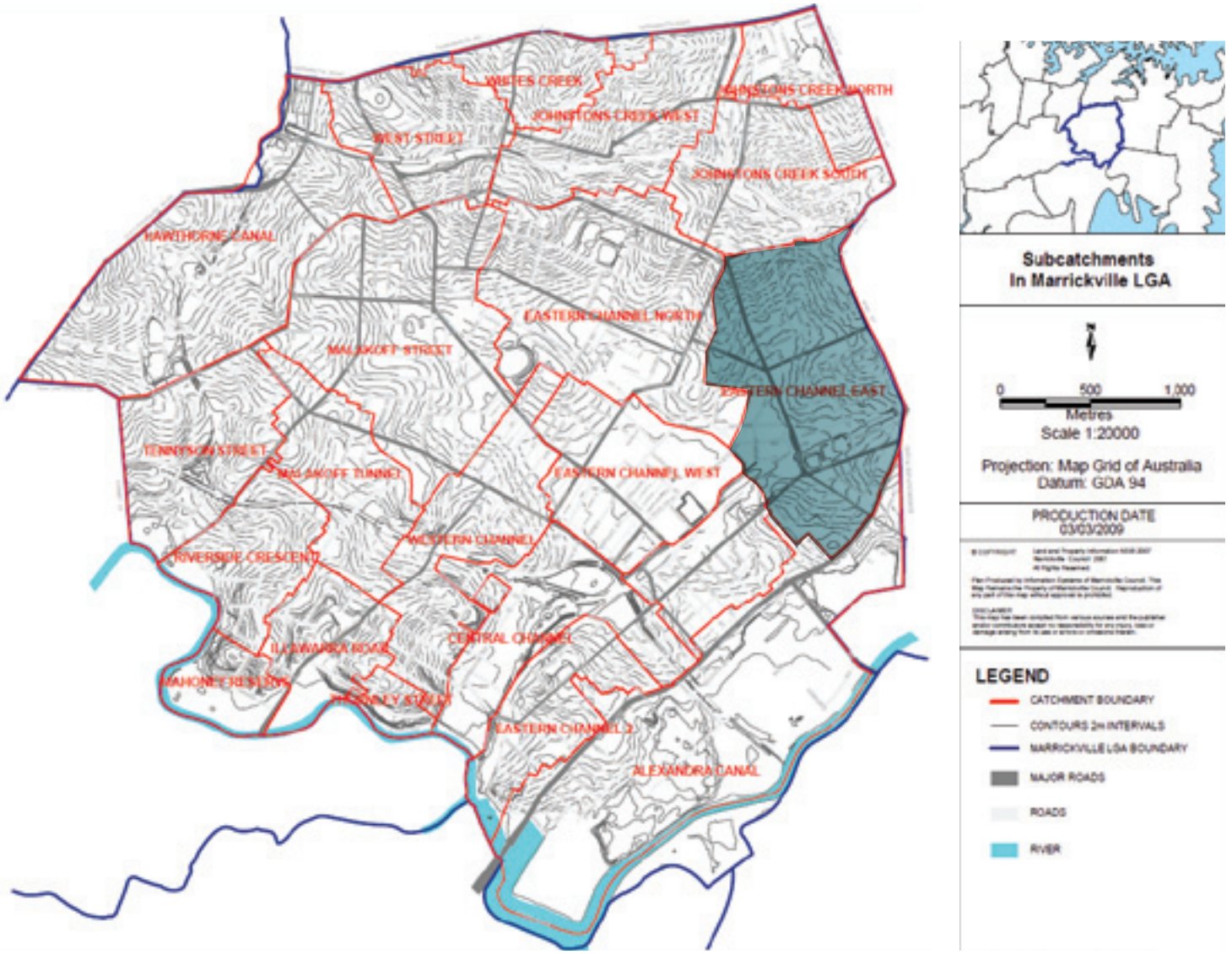
EC East Community Planning Forum, 2009.

2.1 Overview

The EC East Subcatchment is located on the eastern boarder of the Marrickville local government area and covers parts of Newtown, St Peters and Enmore. It is bounded by Enmore Road to the north, the Princes Highway to the south and King Street to the east.

EC East Fast Facts

- 131 hectares
- Population 7,600 (11% of Marrickville LGA) (ABS 2006)
- Mostly residential
- Light to medium industrial areas in south east and south west of Subcatchment
- 14 parks, reserves and ovals, (Camdenville Park (2.8 ha), Enmore Park (1.3 ha), and Simpson Park (0.6 ha)
- Railway infrastructure – section of City to Bankstown line that includes St Peters Railway Station



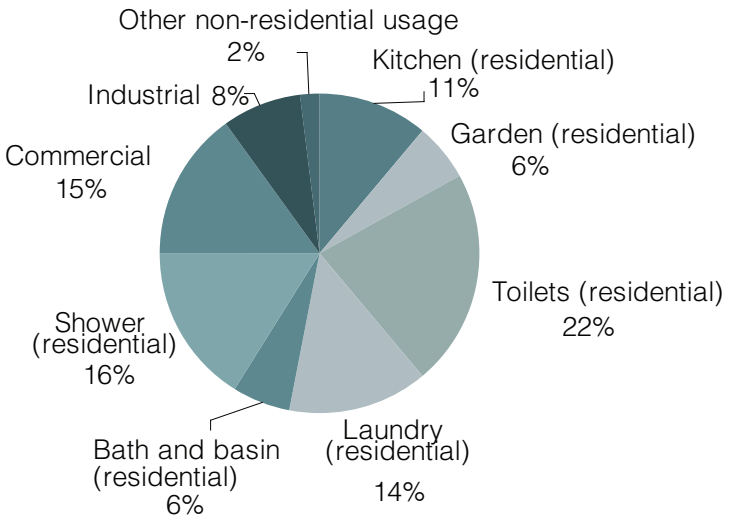
Subcatchments in Marrickville LGA with the EC East Subcatchment highlighted.

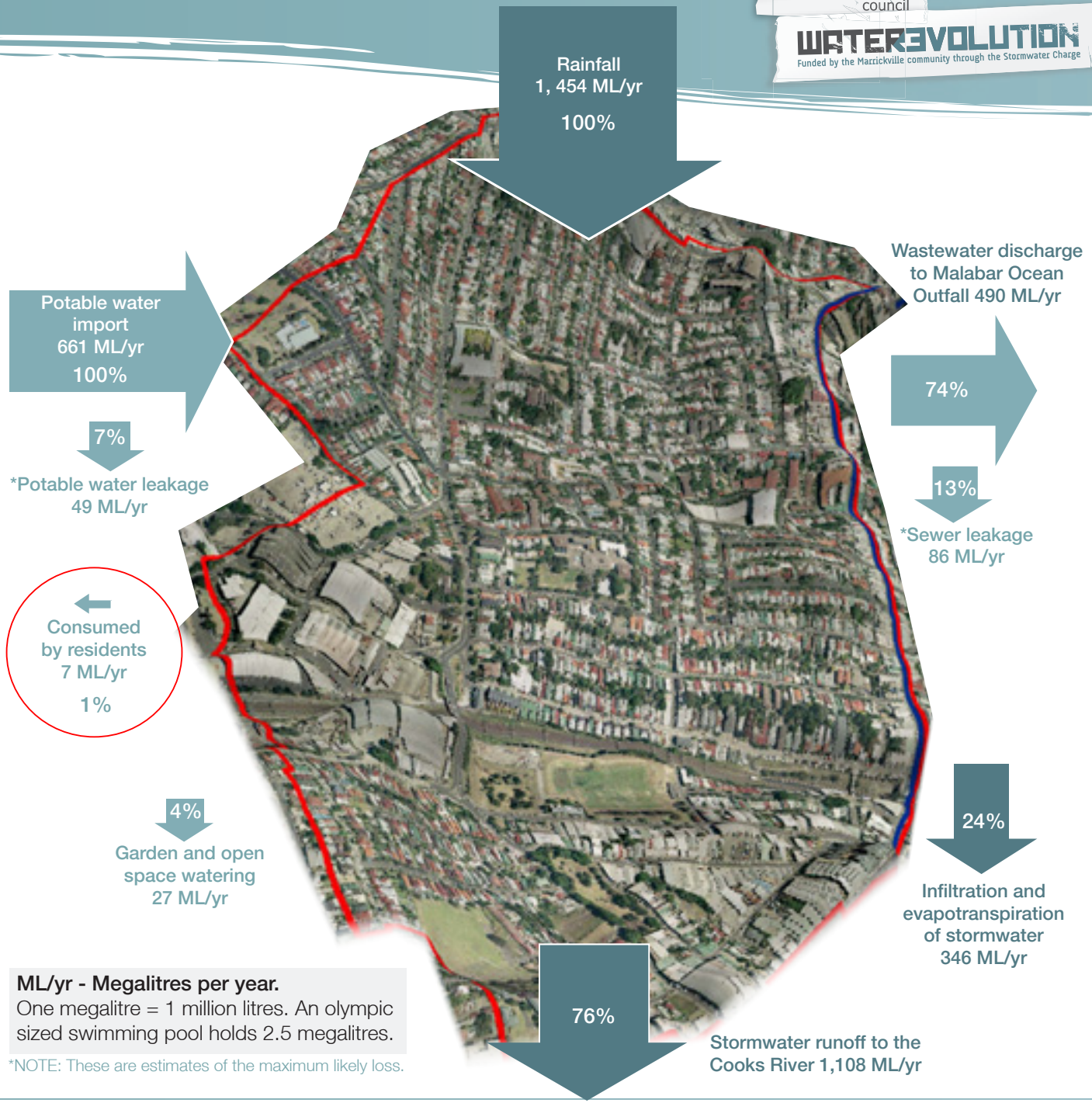
2.2 EC East Subcatchment Water Cycle

The water cycle in the EC East Subcatchment is based on research and data from the Bureau of Meteorology, Sydney Water, and stormwater modelling.

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.

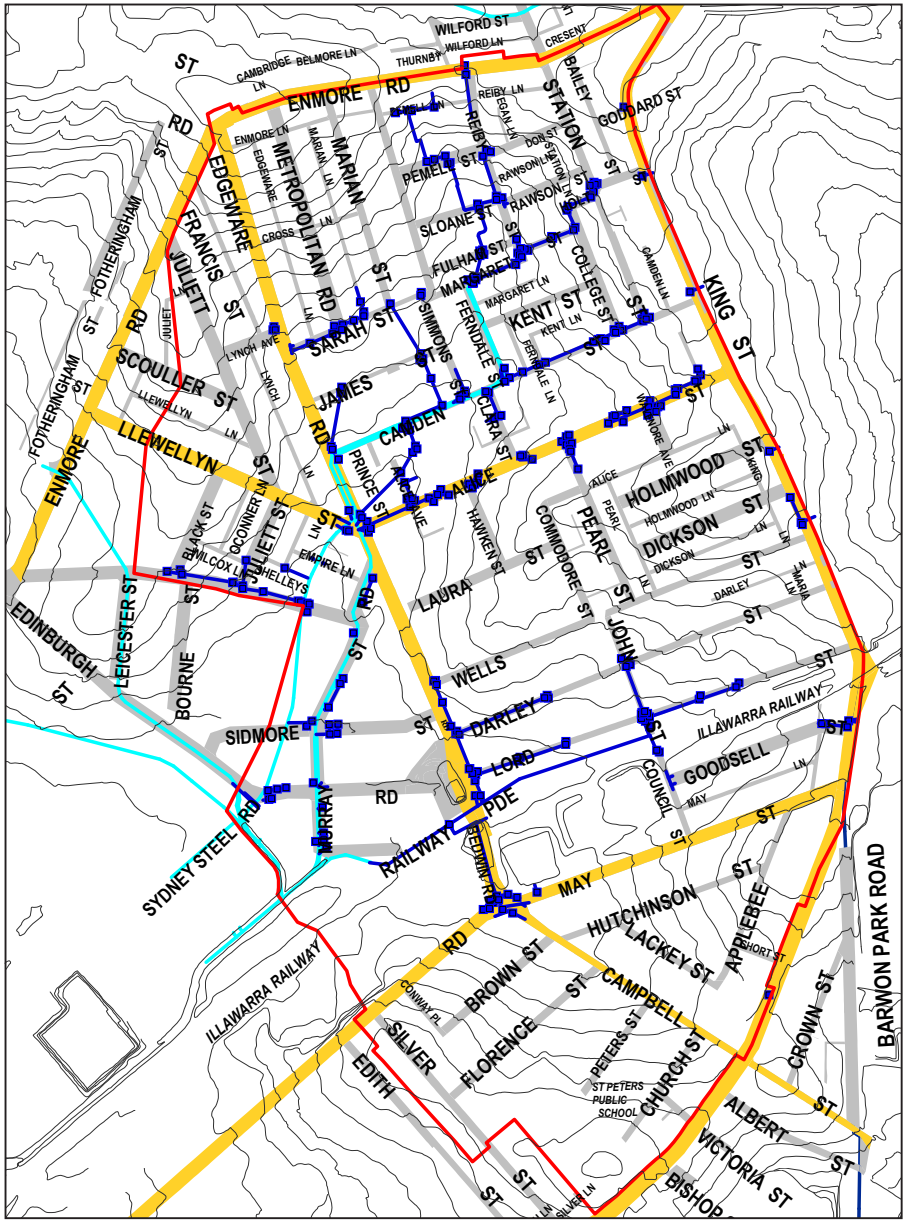
Water Use





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

*NOTE: These are estimates of the maximum likely loss.



The contour map shows the gradient of the EC East 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 western side of the EC East Subcatchment.

Most of the stormwater is collected in two Sydney Water owned trunk drainage lines that discharge water to the Eastern Channel. A small area on the far east side of the subcatchment discharges east into the City of Sydney drainage system.

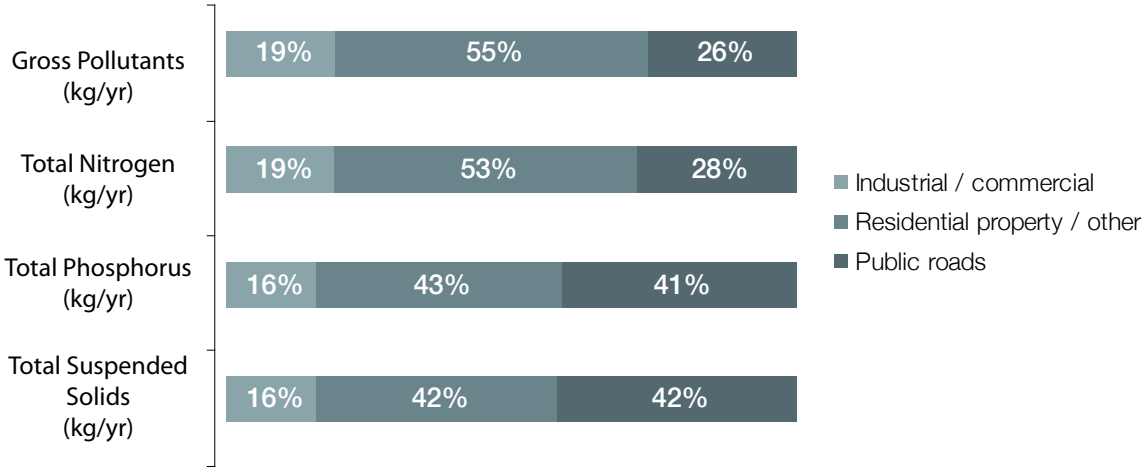
- Drainage Pits
- Drainage Pipes
- Sydney Water Drainage
- Contour Line
- EC East Subcatchment Boundary
- Local Roads
- Major Roads

Above:
Stormwater drainage pit on Railway Parade, Newtown (OurRiver).

Left:
Eastern Channel East, Murray Street Marrickville (OurRiver).

About 81% of the EC East Subcatchment is made up of hard and impervious surfaces, mainly roads (26%), pavement and roofs. These hard surfaces generate approximately 95% of pollutants found in stormwater in the Subcatchment.

Left: May Lane, St Peters. Right: Standing water, Edinburgh Road, Marrickville (OurRiver).



Pollution from different impervious areas

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

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 Office of Environment and Heritage and Botany Bay Water Quality Improvement Program (BBWQIP) to improve stormwater quality.

POLLUTANT	EC East Subcatchment - Current Average pollution loads (kg/yr) *	BBWQIP Stormwater targets for redevelopment (% reduction)	EC East Subcatchment - Target Pollution loads (kg/yr)
Gross pollutants	28,800	90%	2,880
Suspended Solids #	238,000	80%	47,600
Total Phosphorus	403	55%	181
Total Nitrogen	2,440	40%	1,464

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

Private Property

Almost 75% of the EC East Subcatchment is private property, which 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 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.

Stormwater Ponding and Overland Flows

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

1. Pemell Lane & Margaret Street
2. Enmore TAFE Park
3. Camden Street
4. Edgeware Road, Llewellyn & Alice streets intersection
5. Wells Street at the road closure
6. Edgeware Road near Lord Street
7. John & Council streets
8. May Street, Campbell & Unwins Bridge roads intersection
9. St Peters Street

Local flooding in St Peters (Marrickville Council).

Stormwater issues and hot spots identified in interviews with Council and local people.

Illegal Dumping

Illegal dumping is regularly a problem at the following locations:

a. Enmore Lane
b. Edgeware Lane
c. Jct Holt & Station streets
d. Camden Street near Camden Lane
e. Walenore Avenue
f. Council Street
g. May Lane

Above photos: Dumped rubbish, John Street, Enmore, 2008 (OurRiver).

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Residential Dwellings

- Subcatchment area - 131 ha
- Residential dwellings - approx. 3,000

37%

1 storey semi, row, terrace or townhouse

20%

2 or more storey semi, row, terrace or townhouse

18%

Separate Houses

9%

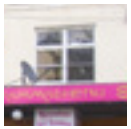
3 storey block – flat, unit, apartment

9%

1 or 2 storey block – flat, unit, apartment

5%

4 storey block – flat, unit, apartment

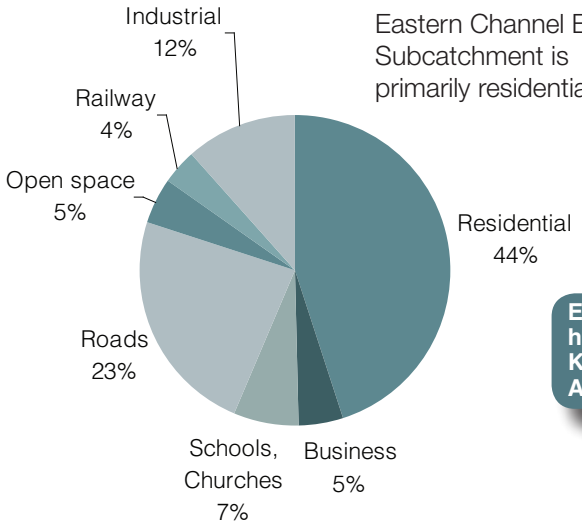


2%

House or flat attached to shop

Land Use

Eastern Channel East Subcatchment is primarily residential



Land use in the EC East Subcatchment

Marrickville Council

The Eastern Channel East Subcatchment falls within Marrickville Council 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 the Eastern Channel stormwater channel and Sydney's desalination project.

Railcorp

Responsible for the management and maintenance of St Peters train station and associated rail infrastructure and stormwater management on its land.

Roads and Traffic Authority

Jointly responsible for the operation and maintenance of King Street/Princes Highway and Enmore Road.

St Peters train station, St Peters (OurRiver).

Departments

Housing NSW

Provides affordable housing options for approximately 3% of residents (ABS Census 2006).

Office of Environment and Heritage

Within the NSW Deparment of Premier and Cabinet, provides funding and regulates Sydney Water and the RTA to ensure that 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.

Land Users

Schools

- Camdenville Public School
- St Peters Public School
- St Pius Catholic Primary School

TAFE NSW Sydney Institute

Enmore TAFE Design Centre operates within the subcatchment.

Commercial and Business

King Street and Enmore Road host a wide variety of business and commercial operators.

- Newtown Precinct Business Association provides a unified representation for all businesses in the Newtown Precinct.
- Marrickville Metro Shopping Centre

Industrial operators

Light to medium industries are located in the south-east and south-west of the Subcatchment. Activities range from smash repairs to distribution centres and art studios.

Community Housing Organisations

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

Places of Worship

- St Peters Church Cooks River – 187 Princes Hwy, St Peters
- St Pius – 256 Edgeware Road, Newtown
- Friends of the Western Buddhist Order Australian – 24 Enmore Road, Newtown
- Sydney Central Fijian – 17-21 Metropolitan Road, Enmore

St Pius V Church, Edgeware Road, Enmore (OurRiver).

Community Services

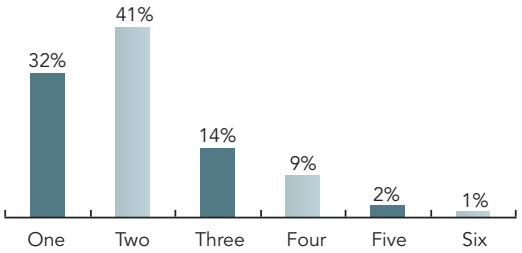
Organisation/ Operation	Activities/Management	Location
Tom Foster Community Care	Provides aged and disability services to the Marrickville community, e.g, Meals on Wheels.	Newtown
Newtown Theatre	Theatrical venue for hire and rehearsal studio; co-ordinates acting classes	Newtown
Sydney City Mission	Refuge for the homeless	Enmore
Our Place	Drop in centre	Enmore
Newtown Neighbourhood Centre	Services for disadvantaged and for people with non-English speaking backgrounds	Newtown

Key Statistics

- Population – 7,661 residents
- Origin – 31% born overseas: United Kingdom (6%), New Zealand (4%)
- Languages spoken at home – 14% non English: 3% speak Greek, 1% Cantonese, 1% Portuguese
- Travel to work – car (41%), train (27%), bus (14%), walk (11%), bicycle, motorbike or a scooter (6%)

Household Density

Number of people per dwelling (density):



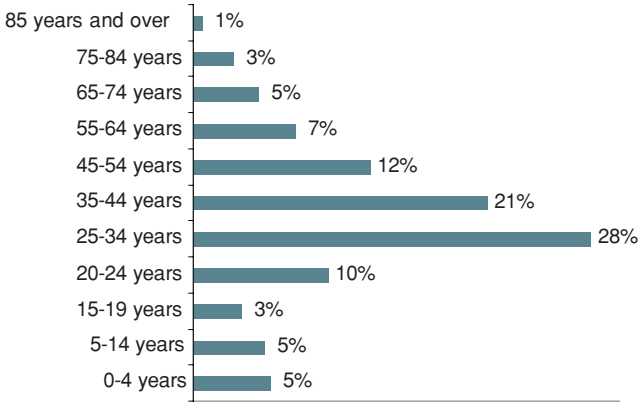
Family types

- 54% of families are couples with no children
- 22% of families are couples with children under 15

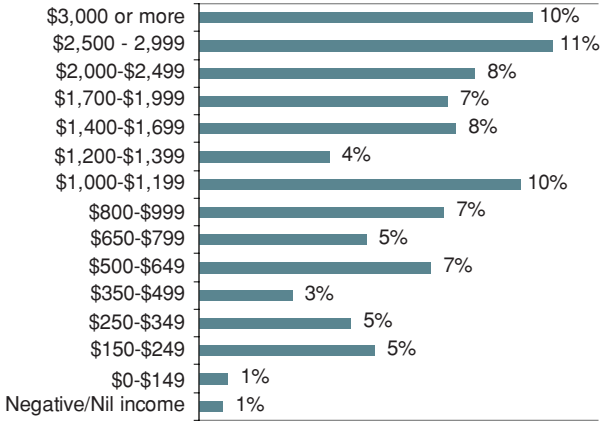
Residency Time

- 69% lived at the same address 1 year ago
- 57% lived at the same address 5 years ago

Age distribution



Weekly household income



- 58% of households have weekly income above Marrickville median of $1,160
- 29% have an income above $2,000 per week

Education

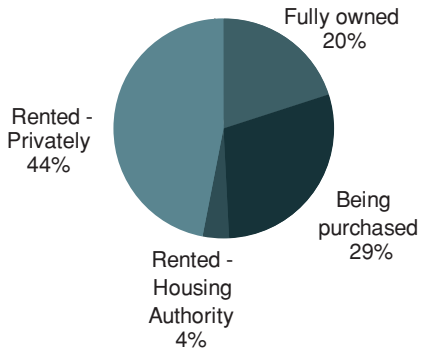
- Educational attendance – 24% (2,531people) – Preschool 1%, Infant / Primary 3%, Secondary 2%, Technical or Further Education Institution 2%, University or other Tertiary Institution 8%
- Non-School qualifications (over 15 years) – University 47%, None 39%, Other 26%

Employment

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

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

Household Tenure



[All data from ABS 2006 Census]

2.9 EC East Community Water Survey

Who answered the survey?

Gender	67% Female 33% Male
Origin	1% Aboriginal or Torres Strait Islander descent 68% Australia 9% United Kingdom 4% New Zealand
Language	95% speak English at home
Education	31% University qualification 29% Postgraduate qualification 14% TAFE or trade qualification
Age	35% 30-39 years 24% 40-49 years 15% 50-59 years 13% 20-29 years 13% 60+ years
Household Type	34% Couple with no children at home 23% Couple with children at home 22% Single person living alone 12% Share accommodation with non-family
Tenure Type	43% Fully owned 28% Being purchased 25% Rented – private 3% Rented – public housing
Dwelling	63% Semi-detached, terrace or townhouse 23% Separate house 14% Flat, unit or apartment
Time in Current Residence	56% 1-10 years 19% 0-1 year 14% 11-20 years 12% 20+ years
Individual Gross Weekly Income	42% $1,000 or more 37% $400-$999 17% $1-$399

The Community Water Survey was carried out in June 2008, with 635 responses (18.5%).

Knowledge of urban water systems

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

- 75% to the nearest waterway (correct answer)
- 14% to the sewerage system

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

Water from:	% Responses	
Driveways, footpaths	92	Correct
Other paved areas	84	Correct
The Roof	83	Correct
The Garden	75	Correct
The kitchen sink	11	Incorrect
The washing machine	11	Incorrect
The shower	11	Incorrect
The toilet	6	Incorrect

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

- 73% underestimated daily water use
- 13% chose the correct range (400-500L per day)
- 9% overestimated daily water use

Behaviour

Of 635 people:

1. Rainwater Tanks

- 50 (8%) have a rainwater tank
- 80% use for garden, 20% for toilet flushing, 16% for washing clothes

2. Greywater Systems

- 170 (27%) reuse greywater
- 90% use it for garden, 11% for toilet flushing.

3. Water Saving Devices

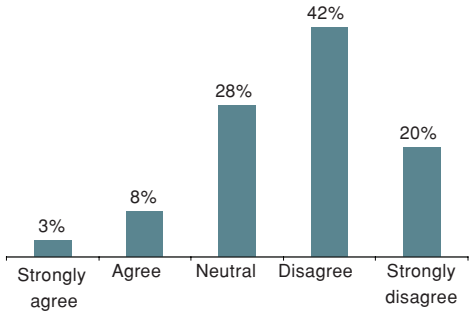
- 493 (81%) have water saving devices

Receptivity to using rain and greywater

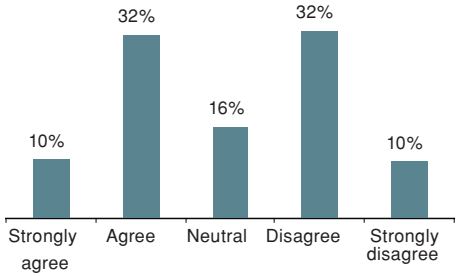
The percentage of people that would consider using rainwater and greywater, and how they would use it.

	Filtered Rainwater	Treated Recycled Water
Watering Garden	96%	95%
Flushing toilet	89%	91%
Washing car	86%	77%
Washing Clothes	78%	39%
Showering	58%	17%
Cooking	33%	5%
Drinking	28%	4%

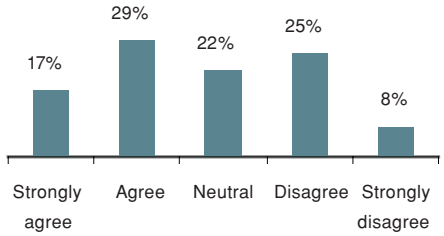
Attitudes to the Waterway Environment



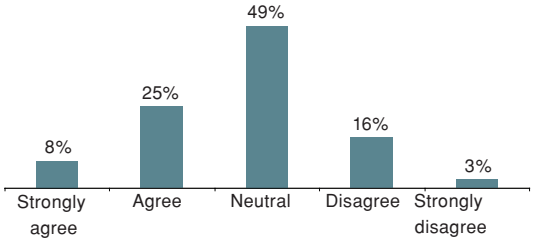
a) 'Jobs are more important than the environment.'



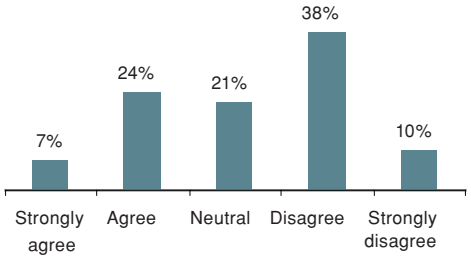
c) 'My daily activities have little negative impact on the waterway environment.'



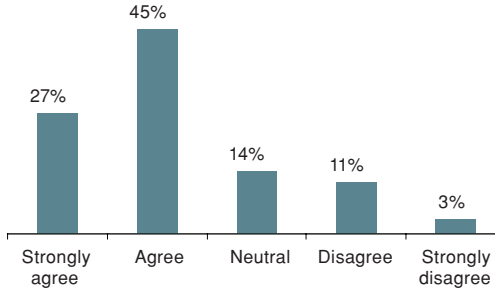
e) 'We should aim for the same waterway conditions as before the Europeans arrived over 200 years ago.'



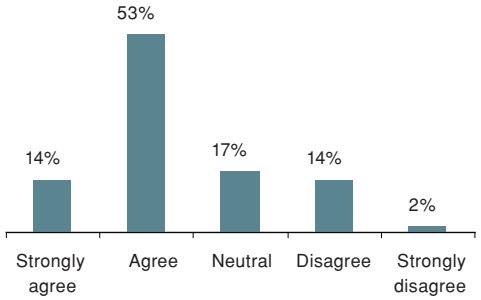
b) 'Access to a healthy natural environment is more important than access to community facilities.'



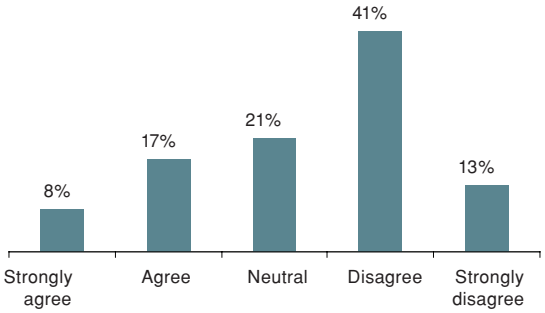
d) 'Government agencies should have the main responsibility for the waterway environment rather than the individual.'



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



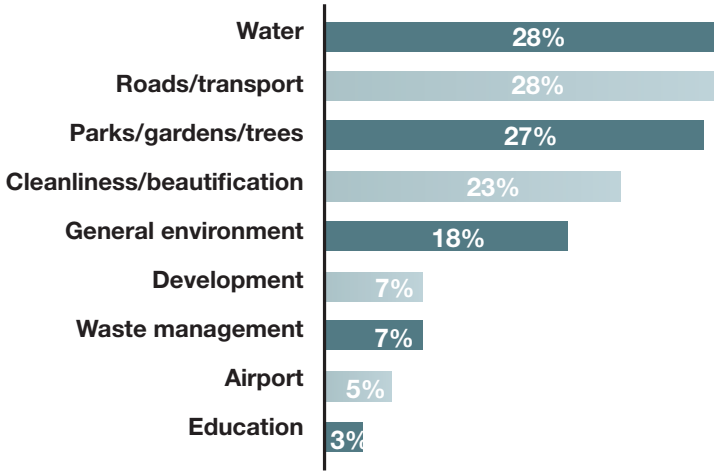
g) 'Most people want to help improve the health of the waterway environment.'



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

Major environmental improvements wanted in the next 20 years.

This question was open ended. The 950 responses were clustered into the categories shown on the graph.



Of the 950 suggestions for environmental improvements, 28% relate to water management (10% regarding water tanks e.g., incentives such as rebates).

Business Water Survey – Summary Results

The June 2009 Business Water Survey received 58 responses from 171 businesses (34% response rate):

- Respondents - retail shops (36%), manufacturing (24%) and food services (20%)
- 74% lease premises - many do not receive a water bill directly and say they have limited power to make changes to the premises

Water use

- 66% - said cost of water to their business was not significant. This means that financial savings related to reduced water use may not be an incentive for these businesses
- 67% - use water for domestic purposes only, i.e. not business related
- 87% - were supportive of using recycled water

Attitudes

The majority of respondents (67%) disagreed that:

"Government agencies should be mainly responsible for the waterway environment rather than businesses."

3.1 EC East Subcatchment Vision and Goals

The EC East Subcatchment 2050 Vision was created by the Subcatchment community at a series of planning sessions in 2009. The community goals set out clear aims for the Cooks River and the Subcatchment for the year 2050, as well as interim goals for 2021, which will help acheive the 2050 goals.

EC East Subcatchment Vision for 2050

In 2050, we are happy, recognise our dependence on natural systems and we value water. We have a profound sense of achievement with respect to the changes to our subcatchment and lifestyles. We are leaders in sustainable practice and innovative design. Our society is active and engaged, and collaborative processes have influence beyond the subcatchment.

In 2050, a holistic approach is taken in the design, maintenance and improvement of the local natural and built environment. All new development is considerate of future generations, and water sensitive technologies are familiar, affordable and widely used.

Our waterways, wetlands and green spaces are thriving urban ecosystems that support cultural activities, recreation or local food production.

3.2 EC East Subcatchment 2050 Goals

In 2050:

1. 100% of Subcatchment people understand and own the ECE Subcatchment vision
2. EC East has a reputation as a leader in sustainable practices
3. Public streets and open spaces are co-managed by local people
4. Public streets and open spaces have multiple functions and are retrofitted with water sensitive technologies
5. 100% of buildings meet a high level of the sustainability standards
6. Eastern Channel is naturalised
7. All water used is fit-for-purpose
8. Only 25 % of water run off ends up in the Cooks River
9. Stormwater flooding is minimised through sustainable water management in the Subcatchment

1. Most households and organisations in the Subcatchment are aware of and understand the vision and goals
2. 20% of people actively participate in at least one of the actions contributing to the 2050 goals
3. The majority of the Subcatchment community understands the concept of fit-for-purpose water use
4. The Subcatchment community has adopted sustainable water systems and practices to the extent that household water habits have changed and:
   - 85% of households are receptive to using recycled water for gardens, car washing, toilet flushing, washing machines/clothes and showering
   - 50% of households have some infrastructure in place to allow use of recycled water e.g. dual pipe systems, rainwater tanks, greywater systems
   - 100% of households have some aspects of water conservation/ reuse installed
5. Co-design is the norm for all WSUD in the public domain
6. Co-management of WSUD is accepted practice
7. A minimum of 5 WSUD devices has been established in the EC East Subcatchment
8. All spaces with WSUD are built as open classrooms
9. Incentives are in place that result in sustainable development
10. Policies have been developed and accepted that mandate for fit-for-purpose water use in new buildings, including for:
    - Rainwater / stormwater harvesting
    - Household greywater reuse
    - Wastewater (dual/third pipe plumbing for neighbourhood / centralised systems)
11. A plan for the EC East Channel 'naturalisation' has been established by/with Sydney Water
12. 30% of water is sourced from within the Subcatchment and is fit-for-purpose
13. 50% of water runs off the Subcatchment and into the Cooks River
14. The flood management options proposed for the EC East Subcatchment in 2011 have been implemented

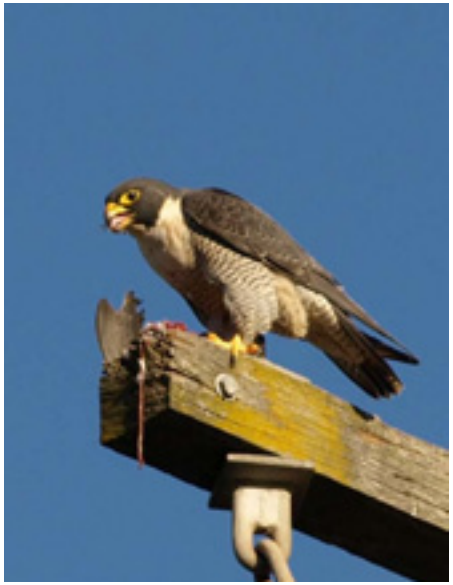
Rain garden in Gayle Adam's backyard built by community volunteers. (Courtesy Gayle Adams, 2011).

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), EC East Subcatchment residents are interested in actions that 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 by linking them to water wherever possible.

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

Pelicans on the Cooks River (Marrickville Council).



Peregrine Falcon photographed in the Marrickville LGA in 2008 (Marrickville Council).

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 biofiltration system (photos and text, Equatica 2009).

Goal 1

Most households and organisations in the subcatchment are aware of and understand the vision and goals.

Actions

1. Develop and implement a comprehensive water campaign on EC East Subcatchment that includes information on sustainable streets.

Goal 2

20% of people actively participate in at least one of the actions contributing to the 2050 goals.

Actions

(See Action 1)

Goal 3

The majority of the subcatchment community understands the concept of fit-for-purpose water use.

Actions

(See Action 1)

Goal 4

The subcatchment community has adopted sustainable water systems and practices to the extent that household water habits have changed and:

- 85% of households are receptive to using recycled water for gardens, car washing, toilet flushing, washing machines/clothes and showering
- 50% of households have some infrastructure in place to allow use of recycled water e.g., dual pipe systems, rainwater tanks, greywater systems
- 100% of households have some aspects of water conservation/reuse installed.

Actions

2. Update the social and physical profile every 5 years:

a. Administer a community water survey.
b. Model the water cycle including the area of hard, impervious surface.

3. Establish a community working group to document and publicise the sustainability achievements in the subcatchment.

4. Identify and promote local Sustainable Water Ambassadors.

Goal 5

Co-design is the norm for all WSUD in the public domain.

Actions

5. Work with subcatchment stakeholders on the design and maintenance of on-ground options proposed for:

a. Tom Foster car park
b. Pemell St
c. Enmore TAFE Park
d. Goodsell St
e. Camdenville Park
f. St Peters Triangle
g. Simpson Park

6. Ensure long-term capital works plans are prepared with multidisciplinary input.

7. Develop guidelines for Council that focus on the process of collaboration, co-design and management that make it easier for people to engage in local subcatchment issue.

8. Develop a Council policy that all works, locally applicable plans and zoning changes must consider and address the relevant subcatchment(s) profiles.

9. Map all Sustainable Urban Water Management (SUWM) projects / developments by subcatchment on Council's web site.

Goal 6

Co-management of WSUD is accepted practice.

Actions

10. Identify projects in the subcatchment that can be co-managed with the community, e.g., Bush Pockets, community gardens, and sustainable streets.

Goal 7

A minimum of 5 WSUD devices has been established in the EC East Subcatchment.

Actions

11. Incorporate WSUD into public works and operational programs.

12. Work with the EC East Working Group and IUWM Group to implement the WSUD options proposed for the subcatchment public domain:

a. Cost them;
c. Prioritise them; and
d. Identify and seek funding opportunities.

Thornley Street rain garden, community planting day 2010 (Equatica).

Goal 8

All spaces with WSUD are built as open classrooms.

Actions

13. Include locally relevant interpretative elements in the design of all WSUD projects.

14. Include WSUD sites in local learning / cultural programs.

Goal 9

Incentives are in place that result in sustainable development.

Actions

15. Investigate sustainability incentives suitable for Marrickville LGA.

16. Promote Federal and State government sustainability incentives to businesses, residents and property owners.

17. Promote rainwater tanks through the Marrickville Rainwater Tank Incentive Scheme.

Goal 10

Policies have been developed and accepted that mandate for fit-for-purpose water use in new buildings, including for:

- Rainwater and stormwater harvesting
- Household greywater reuse
- Wastewater (dual and third pipe plumbing for neighbourhood and centralised systems).

Actions

18. Incorporate findings from fit-for-purpose water use research into submissions to the State Government.

Goal 11

A plan for the EC EAST 'naturalisation' have been established by/with Sydney Water.

Actions

19. Initiate a discussion with Sydney Water Corporation about naturalisation of the Eastern Channel to determine:

a. its willingness;
b. its capacity; and
c. the project feasibility.

The Illawarra and Bankstown Railway lines, viewed from Bedwin Road St Peters (OurRiver).

Goal 12

30% of water is sourced from within the Subcatchment and is fit-for-purpose.

Actions

20. Work with the EC East Subcatchment Working Group and key Council staff to identify the fit-for-purpose options in the public domain, including stormwater harvesting from Camdenville park:

a. Cost them;
b. Prioritise them; and
c. Identify and seek funding opportunities.

21. Identify other reuse opportunities within the Subcatchment.

22. Ensure the WSUD criteria in the DCP are applied.

Goal 13

50% of water runs off the Subcatchment and into the Cooks River.

Actions

(See Actions 21, 22, 23)

Goal 14

The flood management options proposed for the EC East Subcatchment in 2011 have been implemented.

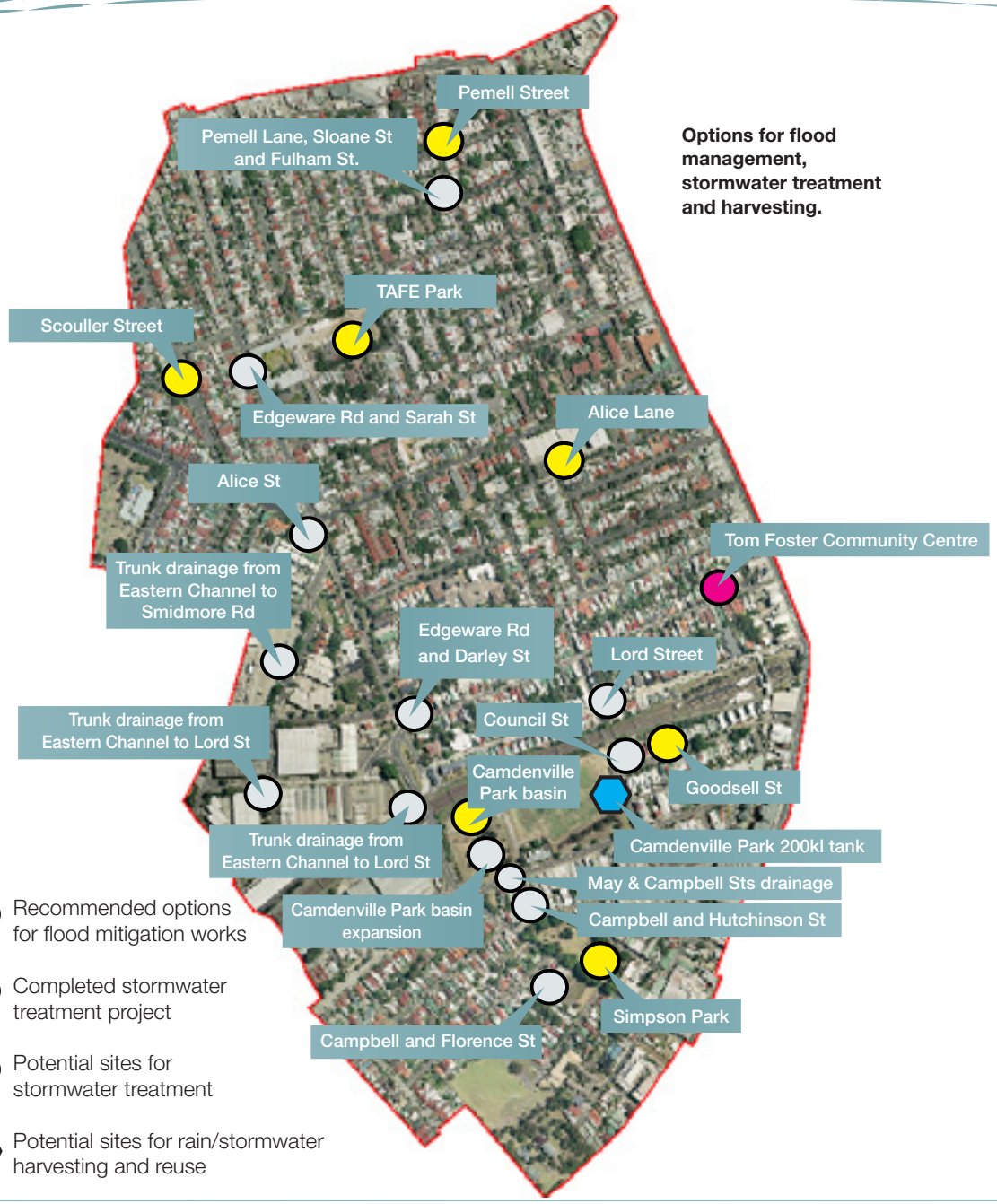
Actions

23. Work with the EC East Subcatchment Working Group and key Council staff to implement the flood management WSUD options proposed for the subcatchment public domain:

a. Cost them;
b. Prioritise them; and
c. Identify and seek funding opportunities.

24. Work with relevant stakeholders to:

a. Update Council's Onsite Detention Policy;
b. Update and collect subcatchment flood data;
c. Install flood depth markers;
d. Update the Local Flood Plan in association with the State Emergency Services; and
e. Implement a public awareness campaign for flood preparedness in association with the State Emergency Services.



Options for flood management, stormwater treatment and harvesting.

4.1 Development of Options

A range of options for on-ground works to harvest stormwater, treat runoff going to the Cooks River and manage flooding were developed for specific locations following the vision sessions, planning forum and on site inspections by Council staff. These include Camdenville Park, Simpson Park, Enmore TAFE Park and a number of sites on streets as shown on the aerial map on this page.

The sites were selected by:

- looking at opportunities and constraints;
- calculating potential reductions in pollution to the Cooks River;
- calculating approximate water savings that could be achieved; and
- determining their flood management benefits.

Some locations could accommodate works that manage multiple issues. For example, Camdenville Oval could have works that store and treat stormwater while also managing flood waters.

To determine the priority for implementation, the options were evaluated using specific criteria relevant to each site, such as pollutant removal rates, and ability to modify flooding. The quadruple bottom line (QBL) assessment, involving social, environmental, economic and governance considerations, such as land ownership, was applied to all options. (For details of criteria, see Golder Associates, 2011, p75).

The final options for on-ground works were developed by consultants in collaboration with Council and the subcatchment community, as outlined in the consultant's technical report (Golder Associates, 2011).

4.2 Options for treating and harvesting stormwater in EC East Subcatchment

The table below lists the sites that can be further investigated for stormwater treatment and harvesting. These options, detailed in the EC East Subcatchment Technical Report (Golder Associates, 2011), were further reviewed by Council.

*Option	Description	Considerations	Approximate Cost
1	Rainwater Tank Incentive Scheme	None	Funded
2	Rain gardens for multi-unit dwellings	Adopted in new WSUD DCP	Cost borne by developers
3	Goodsell Street bioretention system	80m^2 bioretention system treating 22,000m^2 catchment. Consider future stormwater harvesting scheme for Camdenville Oval	$120,000
4	Alice Lane bioretention system	150m^2 bioretention system treating 8,000m^2 catchment	$80,000
5	Camdenville Park stormwater harvesting from Council St and Goodsell St - 200kL tank	Long term planning for rehabilitation and upgrade of Camdenville Park	$330,000
6	Pemell Street bioretention swale	300m^2 bioretention swale treating 15,000m^2 catchment	$300,000
7	Scouller Street bioretention system	100m^2 bioretention system treating 9,500m^2 catchment	$60,000
8	Camdenville Park wetland	6,000m^2 wetland treating 220,000m^2 catchment. Undertake only after Camdenville Park contaminated lands results are available and develop option in unison with Park masterplan	$700,000
9	Simpson Park bioretention system	180m^2 bioretention swale treating 17,000m^2. Undertake only after Option 8 flood mitigation works undertaken (Campbell St trunk drainage) has been implemented	$280,000
10	TAFE Park bioretention system	28,000m^2 catchment. Dependent on TAFE development. Council to liaise withTAFE during the planning and design to ensure inclusion of WSUD measures on site	Unknown

* Shown as ◯ on map on page 22

Potential stormwater treatment and harvesting projects and their contributing catchments (highlighted).

4.3 Recommended priorities for flood mitigation in EC East Subcatchment

Priority sites recommended for stormwater upgrades to reduce impacts of flooding in problem areas in the EC East Subcatchment are listed below. These include the intersections of Campbell and May Streets, Lord Street and Edgeware Road, and Alice Street and Edgeware Road among others.

*Option	Description	Constraints	Approximate Cost
1	Non-structural measures including policy updates, flood markers and flood data collection, emergency management and development controls	None	$50,000
2	Drainage optimisation at May and Campbell Sts	None	$250,000
3	Alice St intersection extra pits and pipe to Empire Lane channel	None	$90,000
4	Edgeware Road near Sarah Street drainage	None	$500,000
5	Trunk drainage duplication from Eastern Channel to Lord St	Subject to Sydney Water Approval	$1,050,000
6	Council Street drainage	Consider future stormwater harvesting requirements	$250,000
7	Diversion of flows from Pemell Lane, Sloane and Fulham Streets	Consider possible WSUD measure in Pemell St	$260,000
8	Campbell St trunk drainage to Florence St	Need to consider total Camdenville Park system in design	$700,000
9	Trunk drainage duplication from Eastern Channel to Smidmore Road	Subject to Sydney Water approval	$900,000
10	Lord Street drainage	Undertake only after Option 5 implemented	$800,000
11	Campbell and Hutchinson Streets drainage	Undertake only after Option 8 implemented	$500,000
12	Trunk drainage duplication from Smidmore Road to Edgeware Road	Undertake only after Option 6 implemented	$1,400,000
13	Camdenville Park Basin expansion	Develop in unison with Park masterplan	$1,300,000
14	Edgeware Road and Darley St drainage	Undertake only after Option 10 implemented	$900,000

* Shown as ◯ on map on page 22

Recommended flood management works for EC East Subcatchment.

4.4 Tom Foster Community Care's new permeable car park

Top: Tom Foster Community Care before works began; Middle and bottom: During works, June 2010 (OurRiver, Marrickville Council).

Selected stormwater treatment works for the EC East Subcatchment

The permeable paving at the Tom Foster Community Care was funded as an early action project.

The new permeable paving car park was built in July 2010. The new paving allows stormwater to infiltrate through the car park's surface where pollutants are removed using a sand filter before the stormwater enters the drain to the Cooks River.

The 250m^2 permeable paving is an additional water sensitive urban design technique at the centre, which also harvests rainwater and uses it to flush the toilets. Council uses this centre to host its regular urban water education and sustainability workshops.

Estimated treatment performance

Pollutant	% Removal by the 250m^2 system	Best Practice (% removal)
Total Suspended Solids	77%	85%
Total Phosphorous	54%	65%
Total Nitrogen	36%	45%
Gross Pollutants	100%	100%

In high density residential areas like the EC East Subcatchment, permeable paving is one of the more suitable stormwater quality improvement techniques available.

Top and middle: Tom Foster Community Care after completed works; Bottom: permeable car par opening, August 2010 (OurRiver, Marrickville Council).

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.
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 Sydney Metropolitan Catchment Management Authority (SMCMA), 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/bbcci/
CALD	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.
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.
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.
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.

5. Glossary

Term	Meaning in Subcatchment Planning.
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 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 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 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).
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.
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.

Term	Meaning in Subcatchment Planning.
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.

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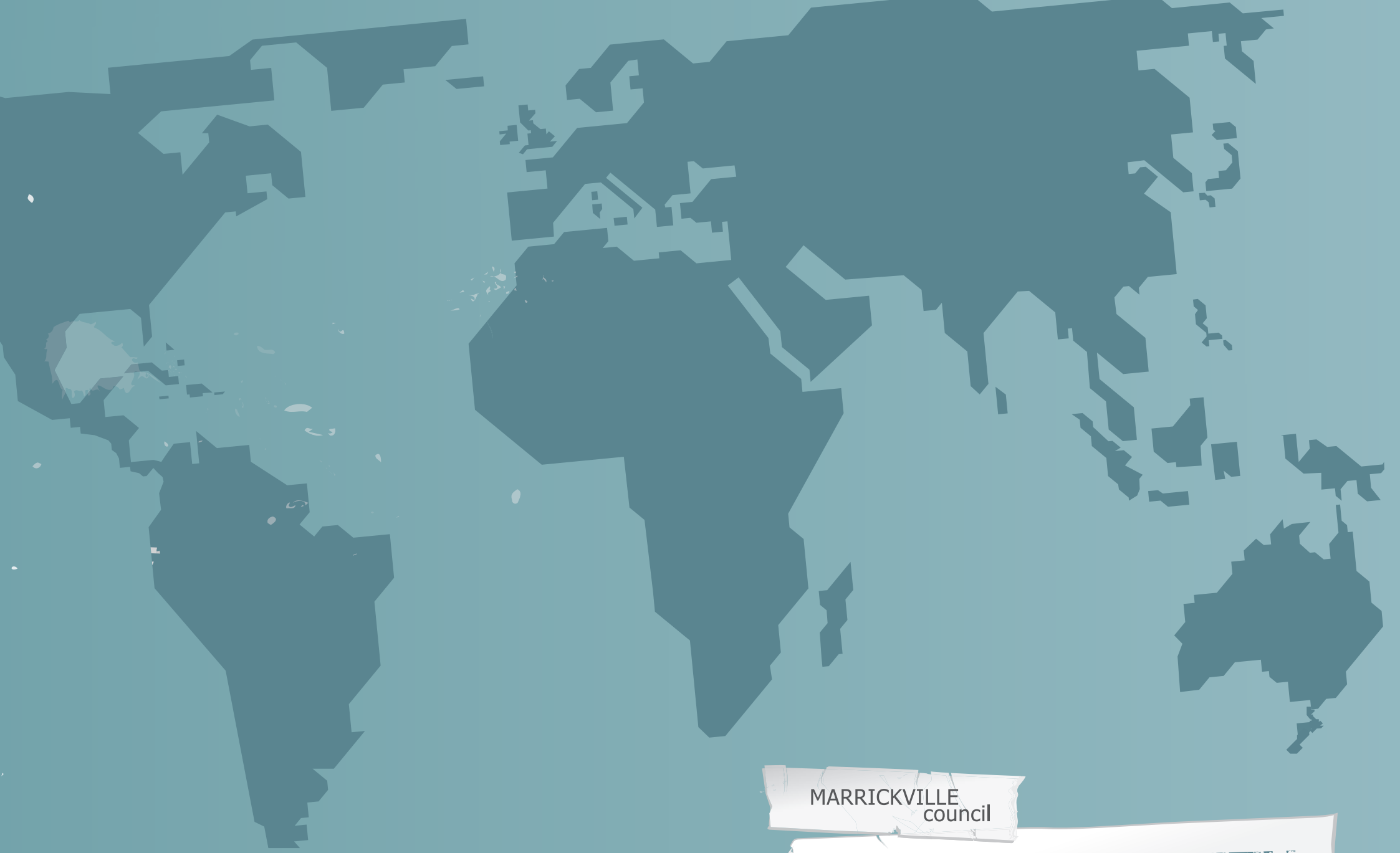

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