Natural Environment

Goal: ***A sustainable city that protects and enhances the natural environment for present and future generations***

5 Water

Indicators:

• No. of water pollution complaints to Council	⇦
• No. of water pollution complaints to Department of Environment & Conservation pollution line	⇦
• Percentage of catchment treated by stormwater pollution devices	⇨
• % of time water quality passed faecal coliform pollution guidelines at Jew Fish Bay baths	⇨
• % of time water quality passed enterococci pollution guidelines at Jew Fish Bay baths	⇦
• Water consumption per capita (kL)	⇨
• No. of rainwater tanks installed in LGA (based on rebates)	⇨

⇦ Moving away from Community Vision ⇨ Moving towards Community Vision

The Hurstville LGA encompasses parts of the Georges River and Cooks River catchments. A 'catchment' is an area of land that collects surface water which then drains to a common river or major body of water such as a bay. Each catchment is separated by hills or ridges which direct the surface water into creeks, drains and channels. Everything which happens in a catchment is linked. Anything that happens upstream can have an impact downstream. A pollution incident in the upper part of a catchment can have a harmful impact on water quality and aquatic plants and animals further downstream.

5.1 The Georges River Catchment

The Georges River is one of Hurstville's primary natural assets due to its aesthetic, recreational and biological value. The Georges River rises 5km southeast of Appin, near Campbelltown at a height of 350m. The river winds its way 96km to Botany Bay. It is divided into three main regions: the upper (freshwater section from Appin to Liverpool Weir); middle reaches (Liverpool Weir to Salt Pan Creek) and lower (Salt Pan Creek to Botany Bay).

The Georges River catchment is very large and covers an area of 960km^2. It is highly urbanised and supports a wide range of land uses, including an Army firing range, market gardens, agriculture, mining, industrial manufacturing, landfill, and nuclear research facility. Large bushland areas, including remnant floodplain forests of the Cumberland Plain and riparian areas still remain.

Some of Sydney's older suburbs including Rockdale and Hurstville are in the catchment, as well as some of its newest housing estates in the area of Liverpool and Fairfield. Around 1.2 million people live in this south-western Sydney catchment.

The local government area of Hurstville City Council is located on the foreshores of the lower Georges River, and Salt Pan Creek forms a natural boundary to the west. Salt Pan Creek is a major tributary of the Georges River and covers a total catchment area of 26km^2, of which 5.2 km^2 is in Hurstville. It drains the suburbs of Riverwood, and parts of Peakhurst and Lugarno. The sub-catchment is dominated by residential properties with small areas of foreshore and parkland including the CF Williams Reserve and Georges River National Park. There are three commercial shopping strips which include Riverwood, Lugarno and Peakhurst. There are also 3 sub-catchments within Hurstville's lower Georges River catchment area, including Lime Kiln Bay, Jewfish Bay/Gungah Bay and Edith Bay.

5.2 Cooks River catchment

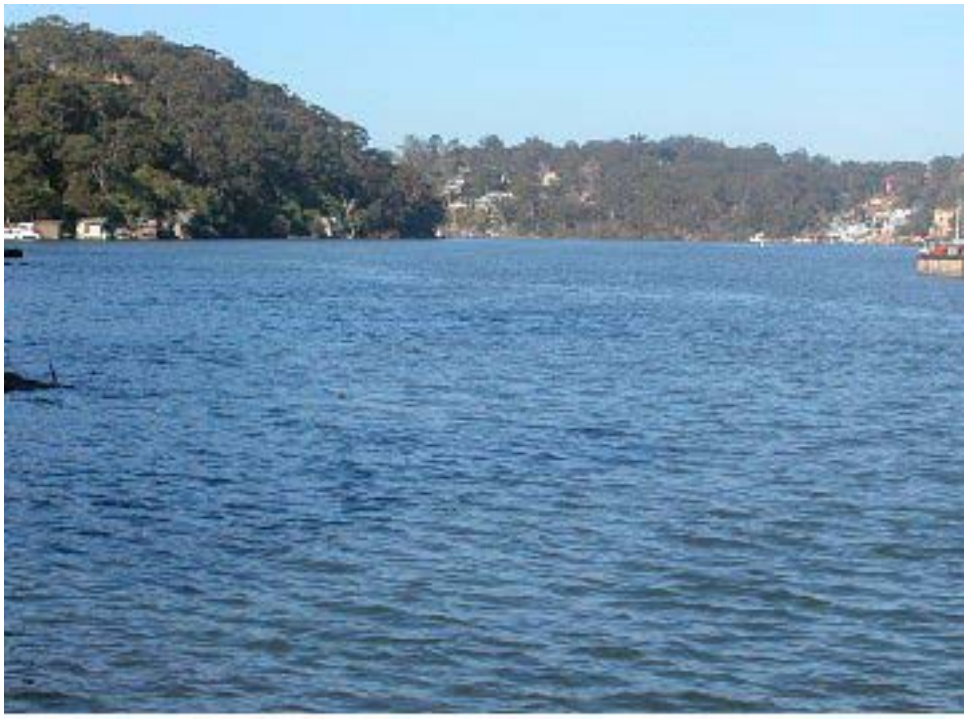
Some stormwater from the Hurstville LGA flows into the Cooks River via piped drainage systems. Hurstville's part of the Cooks River catchment takes up approximately 9.1%.

The Cooks River originates in Bankstown and flows 23 kilometres east to discharge into Botany Bay just south of Sydney airport. The catchment area covers an area of 100km2 and is highly developed. The catchment provides a home to over 400,000 people and has a variety of land uses, ranging from industrial to open space. Little remains of the original landscape and vegetation, even though the river is flanked by parkland and open space for most of its length.

The major tributaries of the Cooks River are Wolli Creek and Bardwell Creeks, Muddy Creek, Alexandra Canal and Sheas Creek, Cup and Saucer Creek, Cox's Creek and Freshwater Creek. There are 2 sub-catchments within Hurstville's Cooks River catchment area, namely Wolli Creek and Bardwell Creek.

Wolli Creek is the second biggest sub-catchment of the Cooks River, covering a total area of 15.52km^2. Wolli Creek begins as a watercourse in Beverly Hills adjacent to Canterbury Golf Course. In Hurstville's area of the catchment, Wolli Creek drains the suburbs of Beverly Hills, Kingsgrove and Hurstville, before flowing through suburbs of Rockdale.

Bardwell Creek is the major tributary of Wolli Creek and has a total catchment area of 6.36km^2. The upper reaches of Bardwell Creek rise in Hurstville and drains the suburb of Hurstville, before flowing in a north-easterly direction into the local government area of Rockdale, which encompasses the large majority of the catchment. The upper reaches of the Creek are a piped drainage system, which becomes an open concrete channel at Croydon Road in the Bexley Golf Course.



Georges River

5.3 Are we moving towards our goal?

5.3.1 Water quality

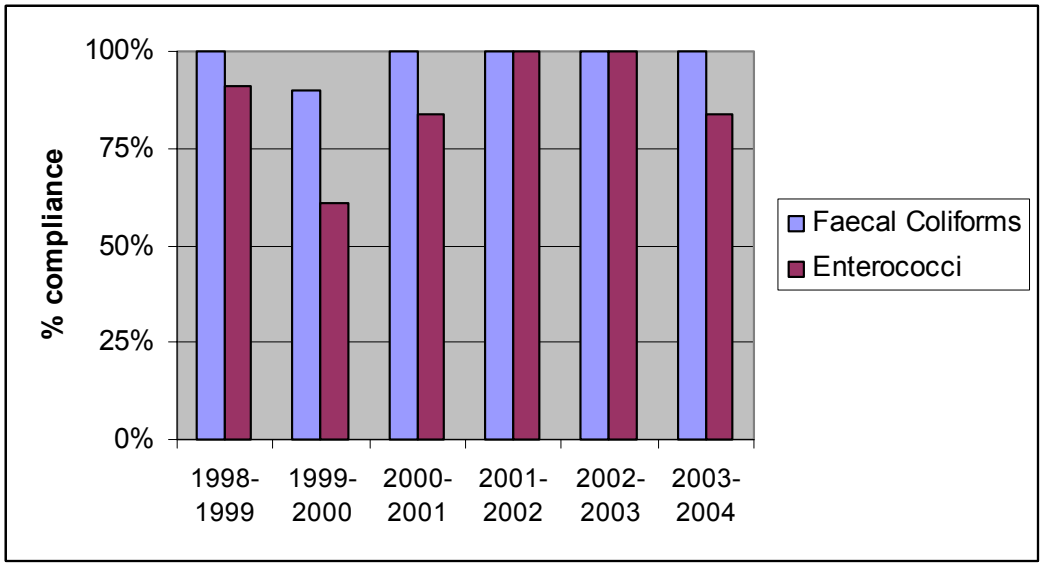
The Department of Environment & Conservation's Beachwatch and Harbourwatch program carries out water sampling and reporting for bacteriorological analysis in order to determine water quality at Sydney recreational swimming sites. Water quality samples are analysed for two bacterial species (faecal coliform and enterococci) with the results measured against the Australian and New Zealand Environment and Conservation Council (ANZECC) water quality guidelines.

Only Jew Fish Bay baths adjacent to Oatley Park on the Georges River is monitored by Harbourwatch in the Hurstville local government area. For the summer season faecal coliform densities complied 100% of the time over the past six years with the exception of the 1999-2000 summer period. However, enterococcal densities have varied substantially ranging from 19 to 100%.

For the fourth consecutive summer season, Jew Fish Bay Baths recorded 100% compliance for bacterial levels of faecal coliform, however the bacterial levels of enterococci declined from 100% in the previous year to 84% in 2003/2004. This has resulted in a decline in the overall summer ranking for Jew Fish Bay baths from number 1 in both the previous two reporting periods, to ranking 8th (out of a possible 18 sites) due to the fall in compliance for enterococci for the 2003-2004 summer period. See the graph below.

Council does not undertake water quality monitoring on an ongoing basis.

Bacterial water quality summer compliance results for Jew Fish Bay baths



Source: Department of Environment and Conservation Harbourwatch reports

5.3.2 Stormwater improvement devices

Since 2000 Hurstville City Council has installed 9 gross pollutant traps (GPTs) to assist capture rubbish and other stormwater pollutants before entering the Georges and Cooks River, and ultimately Botany Bay. GPTs are most useful for catching large items, but smaller items like sediment and chemicals still end up in our waterways. The percentage of catchment treated by stormwater pollutant devices installed by Council has increased from 5.1% in 1999/2000 to 28.4% in 2003/2004 as shown below.

Catchment Area Treated by Stormwater Devices

	99/00	00/01	01/02	02/03	03/04
Percentage of catchment treated by stormwater pollution devices	5.1	20.6	26.5	28.3	28.4

Gross Pollutant Trap

During 2003/04 two gross pollutant traps were installed, including a CDS (continuous deflective separation) GPT in Penshurst Park, near the Aquatic Centre and a Rocla Cleansall device at Jacques Avenue, Peakhurst. Both devices were funded by the Roads and Traffic Authority. The total number of devices installed in the area is 13. The location and type of these devices is shown in the Table below.

Stormwater Treatment Devices in Hurstville LGA

	Device	Location	Funding Source	Year of Installation
1	CDS GPT	William Road, Riverwood. Treats a catchment of about 48 hectares	Council	1998
2	Humegard GPT	Ogilvy Street, Peakhurst West. Installed in road and treats a catchment of 14 hectares	NSW Stormwater Trust	1998
3	Trash rack	Shenstone Road, Riverwood. Treats a catchment of 5 hectares	Council	1998
4	'Humeceptor'	Council's depot, Roberts Road and Depot Avenue, Peakhurst. Treats a catchment area of 2 hectares	Council	1998
5	Rocla Cleansall GPT	Gannons Park, Boggywell Creek. Takes up the catchment up to Park Street. Catchment area of 156 hectares	Federal Government (Coasts & Clean Seas grant)	2001
6	Baramy Trap	Waterfall Road, Lime Kiln Bay. Treats a catchment of 165 hectares	NSW Stormwater Trust/Council	2001

	Device	Location	Funding Source	Year of Installation
7	Trash Rack	Bay Road, Lime Kiln Bay. Treats a catchment area of 37 hectares	NSW Stormwater Trust/Council	2001
8	Rocla Cleansall GPT	Johnstone Street and Ogilvy Street, Peakhurst West. Located in Johnstone Street Reserve. Treats a catchment area of 120 hectares	Roads and Traffic Authority/Council	2002
9	CDS GPT	Pearce Ave, Peakhurst. Located in Pearce Reserve. Covers a catchment of about 19ha.	Roads and Traffic Authority/Council	2002
10	Litter Trap	Arcadia Street, Penshurst. Treats a catchment area of 1.3 hectares	Council	2002
11	CDS GPT	Penshurst Park, near the Aquatic Centre Treats a catchment area of 12 hectares	Roads and Traffic Authority/Council	2003
12	CDS GPT	Edith Bay, Lugarno. Treats a catchment area of 31 hectares	Council	2003
13	Rocla Cleansall GPT	Jacques Avenue, Peakhurst. Treats a catchment area of 4 hectares	Roads and Traffic Authority/Council	2004

5.3.3 Water related complaints

During the 2003/2004 reporting period Council received 172 water related complaints as recorded through Council's Customer Response Management System (CRMS). This is a significant increase in complaints compared to previous years. These mainly related to water pollution, sewer overflows on both public and private property, and runoff from building sites. See table below. The Department of Environment & Conservation received 28 complaints from Hurstville residents, which is 4 more than the previous year. Since 200/01 complaints to the Department of Environment & Conservation has progressively increased.

Water Complaints

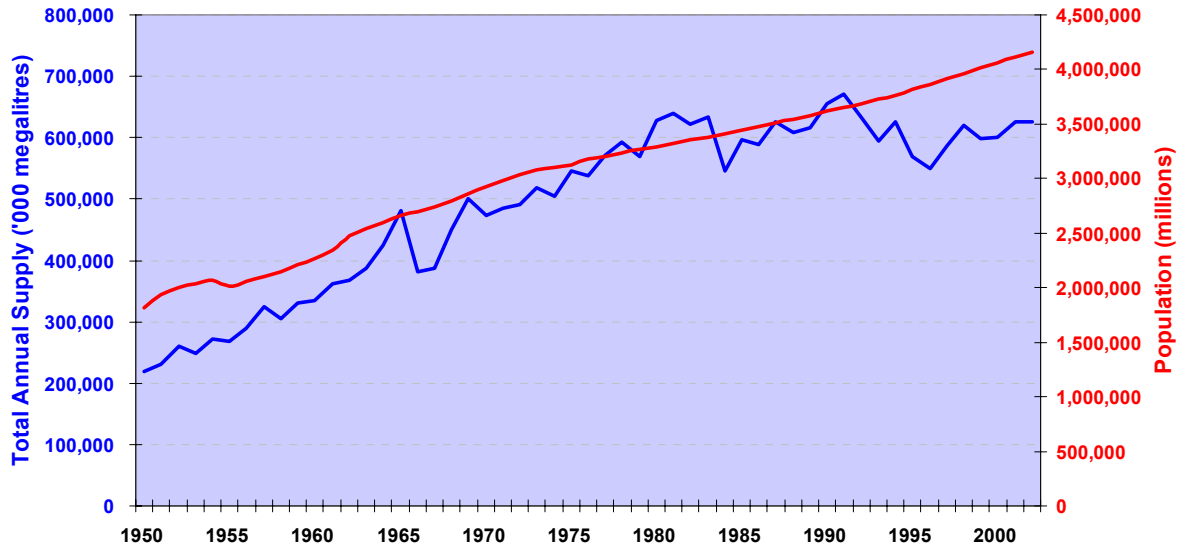
	99/00	00/01	01/02	02/03	03/04
No. of water pollution complaints to Council	33	45	45	42	172
No. of water pollution complaints to Department of Environment & Conservation pollution line	10	8	16	24	28

5.4 Water Consumption

The total demand for water in Sydney has increased significantly over the past 50 years as shown in the graph below. In the last few years Sydney and other parts of NSW has been experiencing drought conditions which coupled with rising water use due to increasing population has led to mandatory

restrictions being put in place in areas of NSW from late 2002. Furthermore, mandatory restrictions came into force in Metropolitan Sydney in October 2003.

Total Demand for Water in Sydney since 1950



Source: Sydney Water 2004

In the Hurstville LGA per capita water consumption has decreased from 88 kilolitres/year for the 2001/02 period to 80 kilolitres/year in the 2003/2004 period. This could be attributed to the water restrictions.

5.5 What has Council been doing?

5.5.1 Stormwater management plan implementation

Urban stormwater management is concerned with improving stormwater quality. Over the past four years Council has focused on implementing its Stormwater Management Plans for the Lower Georges River, Cooks River and Salt Pan Creek catchments. These Plans were prepared in response to an Environment Protection Authority directive issued in 1998, requiring Councils to develop and implement Stormwater Management Plans on a catchment basis. By 2000 the Department of Environment & Conservation had approved the SMPs that Hurstville City Council had formally endorsed. The SMPs addressed environmental protection issues including stormwater quality, river flow, riparian vegetation and aquatic habitat management.

In April 2002 Stormwater Extension Officers were appointed by the Department of Environment & Conservation's Stormwater Trust to guide, assist and coordinate local councils in their management of urban stormwater and SMP implementation and review. A Stormwater Extension Officer was appointed for the Georges River/Botany Bay region and was hosted by the Southern Sydney Regional Organisation of Councils (SSROC).

In November 2003 Council's SMPs were reviewed and updated. The review identified that many of the actions identified in the SMPs had been implemented, and for the purpose of the review, all of the Actions identified were combined into one document and new actions included.

The implementation of many of the SMP actions have been made possible with grant funding that Council has been successful in obtaining from a number of different agencies, including the Stormwater Trust; Georges River Foreshore Improvement Program, Roads and Traffic Authority and the Natural Heritage Trust. Council has secured over $2.4 million in grant funding to implement a variety of actions. Council has also contributed over $1.2 in stormwater improvements (excluding staff time).

5.5.2 Stormwater education

Over the past four years Council has carried out four stormwater education projects to educate primary schools, industry and small business on stormwater pollution and management issues. These projects had been identified in Council's SMPs.

5.5.3 'Catchment care at Hurstville' - school environmental education program

As part of a $103,685 Stage 4 grant from the Stormwater Trust, Council initiated the 'Catchment Care at Hurstville' school environmental education program in October 2002. The first stage of the program was a poster competition about caring for the environment. Students in Year 1 and 5 were invited to design a poster around four different environmental themes. Over 140 posters were designed and the four winning poster designs were painted onto two of Council's garbage trucks to promote the environmental messages depicted.

A total of 12 out of the 15 local primary schools participated in the program, involving about 2190 school students. The school visits covered stormwater pollution, recycling, waste avoidance, composting, reuse, noise pollution and air quality. Students were provided with educational materials including a calico bag containing a booklet, pen, bookmark, ruler and take-home environmental checklist. Each school was also provided with a compost bin, kitchen bin for staff to place compost scraps and information on setting up and maintaining the compost bin. The program continued in 2003 with 8 primary schools participating.

Catchment care at Hurstville launch

Teachers were asked to complete evaluation forms about the presentations and the educational materials. Greater than 90% of teachers believed that the program was excellent and provided school children with extensive knowledge of environmental issues. All teachers stated that the program had a high impact due to it being fun and interactive; therefore increasing the amount of information that children retain. Council's focus on the development of education and awareness programs such as this will continue on into the future.

5.5.4 Peakhurst industrial audit program

In 2002 Council also received a Stage 4 grant of $82,000 to undertake environmental audits of various businesses in the Peakhurst Industrial Area, including panel beaters, mechanic workshops; joinery workshops etc. The project's aim was to improve the environmental practices of businesses and to improve downstream water quality in Lime Kiln Bay. An Environmental Assessment Officer was appointed to undertake the industry audits. This was the first auditing program to be conducted by Council.

Environmental audits were undertaken at premises which were deemed high-risk in terms of potential environmental impact. Of the 673 premises identified in the Peakhurst industrial area, 229 were considered high-risk. High risk industries in the area include motor vehicle services, waste transporters, iron and steel manufacturers, printers, wood and paper product manufacturers. A total of 196 businesses were inspected, as the remaining 33 premises had moved out of the industrial area over the period of the project.

The most commonly occurring non-compliance issues found were:

- liquids inappropriately stored with the potential to contaminate ground and stormwater
- cars washed where water and detergents can drain to stormwater and river

- poor house keeping
- commercial discharge into sewer without treatment or trade waste agreement
- liquids not disposed of correctly
- contaminated parts stored out side
- rubbish scattered outside buildings.

Each business was provided with an environmental education pack which included 'Solutions to Pollution' booklets produced by the Environment Protection Authority and fact sheets on energy, stormwater, groundwater, land contamination, waste, air, environmental penalties, and clean up procedures. Those businesses which had made efforts to comply with legislation as a result of their audit recommendations were given a certificate for assisting in protecting the Georges River from pollution.

5.5.5 'Rubbish and fish don't mix' stormwater awareness campaign

In mid 2003, Council conducted a stormwater awareness campaign for food businesses (restaurants, take-away food shops and supermarkets) along Forest Road, in the Hurstville CBD. This was supported by a $5000 'Drain is Just for Rain' grant from the NSW Stormwater Trust.

The overall aim of the project was to improve the quality of stormwater entering the drains in the Hurstville CBD by educating food businesses about stormwater pollution, through face to face visits, using a Chinese bilingual educator where required.

Surveying food businesses

A total of 54 food businesses were involved in the campaign, including 39 premises which are managed by Chinese business owners. A stormwater awareness survey was developed to assist in gaining an understanding of the level of stormwater awareness of each business proprietor. Business owners received promotional material, including postcards, napkins and posters which were produced in both Chinese and English.

The project was a great success, with post survey evaluation results indicating a substantial increase in the awareness of traders regarding their legal and environmental responsibilities for protecting local waterways. At the end of the project an afternoon tea event was held with food businesses who had participated in the campaign.

5.5.6 Service station auditing program

In 2003 Council commenced a Service Station Auditing Program in partnership with Kogarah Council to reduce the impacts of service stations on the environment. At the commencement of the program an information evening was held for local service station operators to inform them about the project and their legal obligations under the Protection of the Environment Operations Act. All service stations were audited in the Hurstville local government area.

5.5.7 Constructed and rehabilitated wetlands

Since 2000 Council has constructed and rehabilitated existing wetlands which have been heavily degraded due to urban development and increased stormwater pollution. This includes the Lime Kiln Bay wetland, near Waterfall Road and Bay Road, in Oatley and a new wetland at Edith Bay, in Edith Bay Reserve at Lugarno.

Wetlands are land that is inundated with water on a temporary or permanent basis. Wetlands include billabongs, marshes, swamps, lakes, mud flats, mangrove forests. They are virtually any land which is regularly or intermittently inundated with water that is static or flowing slowly and that may be fresh, brackish or saline.

Unfortunately, over the years, many wetlands in urban areas have been damaged or lost through clearing, land filling and development. Wetlands are very important because they provide the following functions:

- Plant and animal habitat
- Breeding and nursery areas
- Water quality and nutrient recycling
- Flood regulation and erosion control
- Recreational value
- Education and scientific research opportunities.

5.5.8 Lime Kiln Bay Wetland

The Lime Kiln Bay Wetland was rehabilitated in 1999/2000 in order to enhance water quality within the wetland and receiving waters of the Georges River; to rehabilitate the wetland ecosystem; and provide increased recreational, aesthetic and educational value for the local community. The project was undertaken with grants from the NSW Stormwater Trust ($600,000) and the Federal Government's Federation Community Grants Program ($20,000), which was matched by Council on a dollar for dollar basis.

The rehabilitation of the wetland area was originally put forward in a proposal by the National Trust in 1994, for the Lime Kiln Bay Society. The proposal was provided to Council who commissioned the

University of Western Sydney to prepare a Rehabilitation and Development Plan for the freshwater complex at Lime Kiln Bay.

The rehabilitation involved the following components:

- Installation of gross pollutant traps on the two major drainage channels entering from Seaforth Avenue and Waterfall Road into the sedimentation basin to remove rubbish and other pollutants entering the basin
- Construction of two large sedimentation ponds to trap coarse sediments and pollutants such as heavy metals and nutrients
- Construction of a dry sediment pond and a stormwater overflow bypass channel
- Establishment of a constructed wetland immediately downstream of the sedimentation ponds, to further enhance water quality; and a surcharge wetland to act as an additional filter for the low flows from the constructed wetland
- Protection of the existing ridge watercourse (situated on the eastern boundary of Oatley Park)and the phragmites reed bed
- Construction of a footbridge over the existing sewer carrier
- Construction of two timber bridges over creeklines adjacent to the two large sedimentation ponds.

The wetland was officially opened in September, 2001. The later stage of the project was completed in November 2002 and involved the construction of a boardwalk and bridge which completes the Oatley Heights loop. This provides pedestrians and cyclists with direct access to the Lime Kiln Bay wetlands and the existing facilities in Oatley Park.

Lime Kiln Bay Wetland

5.5.9 Edith Bay wetland

In 2003/2004 Council upgraded the Edith Bay foreshore area, at Lugarno with a new wetland and boardwalk. A grant of over $500,000 from the NSW Government's Georges River Foreshore Improvement Program was received to undertake the project, which has been jointly funded on a dollar for dollar basis by Council. The project greatly enhances the value of the local environment and adds to the passive recreational opportunities for the area.

The project involved several new boardwalks and associated pathways from the old ferry ramp at the end of Forest Road up to Edith Bay Reserve. It also included the construction of a new wetland in the Reserve, involving the removal of all existing invasive weeds and replacement with native wetland vegetation.

A Continuous Deflective Separation unit (CDS) gross pollutant trap was installed as part of the wetland to capture litter, bottles, cigarette butts, garden clippings and other rubbish which ends up in the stormwater system. The wetland also has a microphyte pond to increase the level of stormwater treatment, through filtering sediments, and nutrients such as nitrogen and phosphorous. The wetland and boardwalk was officially opened in March 2004.

5.5.10 Georges River Riverkeeper Program

Hurstville City Council along with five other councils (Sutherland, Rockdale, Bankstown, Fairfield and Kogarah) contributes $22,000 each year to the Riverkeeper program. This program is managed by the Georges River Combined Councils Committee (GRCCC) which commenced in 1979 for the purpose of having a lobby group representing the nine Councils along the Georges River. Over the years the GRCCC has taken on many environmental initiatives, including the employment of a Georges Riverkeeper.

Over the last two years the Riverkeeper program has headed in a new direction. The GRCCC undertook a review of the Riverkeeper Program and established a joint venture between the Waterways Authority and the GRCCC. A new Georges Riverkeeper model was developed with an emphasis on monitoring the health of the River, halting pollution, and regulating boat users. In addition, the GRCCC negotiated with the National Parks and Wildlife Service to relocate the Riverkeeper premises to a more suitable location in the Georges River National Park.

In March 2003, the current Riverkeeper for the Georges River, Simon Annabel was appointed. Currently the Riverkeeper Program is working on a number of projects along the length of the Georges River, including revegetation works, wildlife habitat enhancement and rubbish cleanups. The GRCCC has also adopted a number of Memorandum of Understandings with organisations including the Chipping Norton Lakes Authority and Cooks River Foreshore Working Group.

5.5.11 Water conservation

In relation to water conservation, Council adopted a 'Rainwater Tank Policy' in December 2002 to encourage residents to install rainwater tanks to conserve water and save money on water bills. Tanks with a capacity of 10,000 litres or less do not require a development application to be lodged to Council, however, they are subject to certain requirements. The Policy outlines details including construction, installation, plumbing and health requirements, and visual appearance.

An information brochure regarding rainwater tanks was published to inform residents on requirements and publicise the rainwater tank rebate of Sydney Water. During 2002/2003 a total of 3 rainwater tank

rebates were issued to Hurstville residents by Sydney Water. This increased significantly to 53 rebates during 2003/2004, indicating that more residents are installing rainwater tanks to conserve water, in light of mandatory water restrictions and drought conditions.

This Policy has since been overridden by the Building Sustainability Index (BASIX) which was introduced by the Department of Infrastructure, Planning and Natural Resources (DIPNR). BASIX is a web-based application designed to assess the potential performance of residential developments against a range of sustainability indices.

The introduction of BASIX into the development approval process reflects the commitment of the NSW Government to water and energy conservation. In 2003, the Government established targets to reduce potable water use and greenhouse emissions for all new residential developments in NSW. From 1 July 2004 new housing in NSW must be designed to achieve a 40% reduction in potable water consumption compared to existing dwellings of the same type.

Furthermore, over the last four years Sydney Water launched its 'Every Drop Counts' program to encourage both Sydney's residents and businesses to significantly reduce water consumption.

Rainwater tank

5.5.12 Catchment management reforms

Over the last four years, there have been a number of significant reforms in relation to catchment management. One of the recent key changes is the establishment of 13 Catchment Management Authorities (CMA) to replace the former Catchment Management Boards which were put in place to replace the Catchment Management Committees. The CMAs were formally constituted as statutory authorities from January 2004 and report directly to the Minister for Infrastructure, Planning and Natural Resources.

The CMAs are the new regional bodies being established in NSW to deliver a regional approach to natural resource management and engage communities in the key issues facing their catchments.

The Sydney Metropolitan CMA will cover the areas of the former Sydney Harbour and Southern Sydney Catchment Management Boards (of which Council was a member). To manage the transitional arrangements for the new CMA, a seven member Local Establishment Team (LET) for Sydney has been created. Throughout this process the LET and establishment staff will continue to provide support for local groups and will ensure a seamless transition to the CMA.

5.5.13 Local implementation plan for the Southern Sydney Blueprint

At the end of 2002, the NSW Government endorsed the Southern Sydney Catchment Blueprint, which is a 10 year plan for natural resource and environmental management in the catchments of, Botany Bay, Cooks River and Georges River, and the adjacent ocean beaches. The Blueprint was prepared by the Southern Sydney Catchment Management Board (SSCMB) which has since been replaced by the Sydney Metropolitan Catchment Management Authority.

The Blueprint commits government agencies to a range of actions and in recognition that local government is the largest natural resource manager in the Board's area, Councils were required by the Department of Infrastructure, Planning and Natural Resources to develop a Local Implementation Plan (LIP) for the Blueprint, in order to identify the synergies between Blueprint actions and existing Council programs and plans, including monitoring and reporting processes. In February 2004 Council's Local Implementation Plan was adopted by Council.

5.6 What are the key issues?

5.6.1 Stormwater pollution

Stormwater is a significant source of water pollution in Hurstville. Stormwater is water which, after rainfall, drains off surfaces like roofs, roads and driveways, directly into drains. Gutters and drains are the beginning of the stormwater system, and transport stormwater runoff through channels and pipes before it discharges directly into our creeks and rivers. Our waterways become polluted when it rains because the stormwater collects cigarette butts, litter, sediment, dog droppings, grease, oil, leaves which are in our yards and streets. Residential properties, shops and industries all contribute to pollution entering our waterways. A summary of major pollutants, their sources and impacts is provided in the Table.

Major pollutants and their sources

Pollutant	Sources	Example	Impact
Oil, grease, petroleum	road surfaces, commercial and industrial processes, service stations, motor repair shops, marina activities etc	Oil, petrol	Toxic to aquatic organisms
Nutrients	fertilisers, detergents	phosphorus, nitrogen and fertilisers from gardens and golf courses	Excessive growth of aquatic vegetation; algal blooms
Toxic material	pesticides, herbicides	garden and agricultural products	Accumulate in food chains and are toxic to organisms

Pollutant	Sources	Example	Impact
Metals	discharge from industry, vehicle emission, road surfaces	lead, mercury, zinc and copper	Concentrate in sediments and bio-accumulate in living organisms
Bacteria and viruses	sewage overflows, defective sewage systems, animal faeces	faecal coliforms and faecal streptococci	Sickness and infections in bathing waters; seafood unsafe
Sediments	building sites	sand, sediment, cement	Destroy habitats by smothering plants and animals living on bottom of waterway
Inorganic litter	roads, parks, shopping centres	fast food packaging, plastics, aluminium cans, paper and cigarette butts	Aesthetically unpleasing and can entangle wildlife causing death
Organic litter	parks, roads, bushland	leaves, twigs, and garden waste	Decreases sunlight penetration in water and destroys habitats

In urbanised areas like Hurstville, stormwater problems are intensified because so much land has been altered and developed for human use such as housing and commercial/industrial purposes. Built up areas have many more hard and impervious surfaces than natural areas which are capable of absorbing and storing large amounts of rainfall. Roofs, roads and footpaths can't absorb rain, so the volume and speed of runoff from urban areas is much higher than in a natural environment.

Stormwater is different from sewage. Sewers collect and carry wastewater from your bathroom, kitchen and laundry to sewage treatment plants where the wastewater (ie sewage) is treated before being discharged into the ocean. However, stormwater is NOT TREATED.

5.7 Sewer

The sewerage system in Sydney is operated by Sydney Water, and includes pipes, pumping stations (SPSs) and sewage treatment plants (STPs) designed to transport and treat sewage flows. Sewer overflows pose a significant impact on stormwater quality runoff and occur during heavy rain due to illegal stormwater connections into the sewerage system and infiltration of water through cracked sewer pipes. During these times the sewerage system becomes overloaded and pressure is released from the system at many points around Sydney through constructed or unplanned overflow points. These overflows then flow into the stormwater system and receiving waterways.

Sydney Water is delivering 'SewerFix', an extensive program of activities that maintain and improve the current operations of our sewerage systems and help protect the local environment. The SewerFix Program's current focus is to improve the flow of sewage in pipes and reduce the amount of sewage escaping into the local environment, through cleaning and relining of pipes in priority areas around Sydney, the Blue Mountains and the Illawarra. Sydney Water and its approved contractors are also

upgrading over half of our 650 Sewage Pumping Stations to ensure there are no sewage overflows at these stations during dry weather.

5.8 Flooding

Modifications to the natural water flow and reduced infiltration causes increased runoff and flow velocity, and the potential of localised flooding. The increase in urban land clearing and impervious surface coverage further exacerbates this affect. Council has identified certain areas to investigate and intends to engage consultants in carrying out a comprehensive flood study.

5.9 Future Actions

Issue	Action
Stormwater	Implement actions in revised Stormwater Management Plan, including the establishment of a catchment based water quality monitoring program
Catchment Management	Implement high priority actions in the Hurstville Local Implementation Plan (Southern Sydney Catchment Blueprint)
Water Sensitive Urban Design	Develop a Water Sensitive Urban Design DCP
Flooding	Undertake flood studies
Water conservation	• Undertake an inventory of water consumption and determine targets for water conservation • Develop a Water Conservation Plan