



NORTHERN SYDNEY REGIONAL ORGANISATION OF COUNCILS
STATE OF THE ENVIRONMENT REPORT

2007 / 2008



Northern Sydney Regional Organisation of Councils

Comprising the Councils of
Hornsby, Hunters Hill, Ku-ring-gai, Lane Cove,
North Sydney, Ryde and Willoughby



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PRESIDENT'S MESSAGE

Once again environmental issues continue to dominate the national and global stage as the impacts of food security, water shortages, global warming and oil prices make their presence felt. At a local level the NSROC councils have been working diligently with their communities to ensure the Northern Sydney region's rich environmental heritage is maintained and enhanced. However, despite a significant policy shift by the federal government, much remains to be done to move Australia away from its high dependence on fossil fuels and other non-renewable resources, and to take up sustainable and environmentally appropriate lifestyles. The current financial crisis gripping the world has made the challenge more difficult than ever, as attention and resources may be diverted from addressing climate change towards economic assistance packages designed to stimulate the economy. Now, more than ever, the challenge of global consumerism must be considered within the constraints of a global market drawing on a finite set of resources operating within a closed ecological system.

This regional State of Environment report (SoE) is the fourth one to be produced by the seven councils (Hornsby Shire, Hunters Hill, Ku-ring-gai, North Sydney, Lane Cove, City of Ryde, and Willoughby City) which comprise NSROC, and is likely to be the last. The State Government has announced its intentions to radically change local government reporting processes and requirements, and one outcome will be that councils report on environmental issues and actions in a new, more integrated way. Although supporting legislation has not yet been released, the Department of Local Government has advised that this reporting structure will not need state of environment reporting in its current format. The NSROC councils hope this decision means environmental issues will be more thoroughly incorporated into council processes and that there is a greater drive towards genuine sustainability through an approach which encompasses financial, social and governance issues, as well as those relating to the natural and built environment.

Recognising this process, the NSROC councils have developed a regional sustainability plan (RSP), completed in August 2008. This landmark document details the 10 main sustainability issues for the region, and identifies appropriate council responses to each of them within a five year timeframe. The document drew on the individual sustainability plans of the seven member councils, and had sustained and substantive input from councils' environmental officers and managers as well as other relevant stakeholders. It is anticipated the RSP will help the NSROC councils in make the transition from the current SoE model to the new integrated model as well as provide for a regionally aggregated policy response to sustainability issues generally. The State Government has informed councils that a transition report will be required next year, and the traditional rigid structure of legislated SoE reporting will not apply.

The central narrative in this year's report concerns our ongoing commitment to working with our communities and businesses to reduce water and energy use through education, training, auditing and the application of new technologies. The NSROC councils have also been improving the performance of their own facilities and introducing measures to improve water quality, protect native habitat and reduce pollution. One of the biggest challenges facing all NSROC councils is reaching their carbon-reduction targets now that many of the easiest steps have been taken. The introduction of a national carbon trading scheme planned for 2010 likely to require investment by councils and require new and innovative approaches to doing business. Councils are capable of both creating credits and debits within a market context.

Much work remains to be done by the councils particularly in the areas of sustainable transport, alternate waste disposal technologies, and in preparing their communities for the anticipated impacts of climate change and population growth. The state government's failure in many areas of infrastructure provision requires more leadership and action at a local level and the NSROC councils are rising to the challenge. Once again, and perhaps for the last time in its present format, I commend this regional SoE report to you as the next step in ensuring the environment of our region receives the strategic, collusive and sustainable management approach it so richly deserves.



Pat Reilly

Mayor of Willoughby Council, President of NSROC, 5 October 2006

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ACRONYMS

AGO	Australian Greenhouse Office
CBD	Central Business District
CCP	Cities for Climate Protection
CMP	Conservation Management Plan
CRR	Catchment Remediation Rate
CSIP	Community Sustainability Indicators Project
DCP	Development Control Plan
DECC	Department of Environment and Climate Change (formerly DEC)
DOP	Department of Planning (formerly known as Department of Infrastructure, Planning and Natural Resources and Planning NSW)
EPC	Energy Performance Contract
ELR	Employment Lands Review
EMP	Estuary Management Plan
ESD	Ecologically Sustainable Development
ICLEI	International Council for Local Environmental Initiatives
KPI	Key Performance Indicator
LEP	Local Environmental Plan
LTP	Local Transport Plan
NPWS	National Parks and Wildlife Service
NSESD	National Strategy for Ecologically Sustainable Development.
NSW EPA	New South Wales Environment Protection Authority (now DECC)
NSROC	Northern Sydney Regional Organisation of Councils (Hunters Hill, Hornsby Shire, Ku-ring-gai, Lane Cove, North Sydney, City of Ryde, Willoughby City)
RFS	Rural Fire Service
SHOROC	North Shore Regional Organisation of Councils
SoE	State of the Environment Report
SMP	Stormwater Management Plan
TCM	Total Catchment Management

Introduction



THE NSROC REGION

The Northern Sydney Regional Organisation of Councils (NSROC) covers a diverse area

of more than 681 square kilometres and is home to more than 500,000 people. It includes the local government areas of North Sydney, Lane Cove, Willoughby City, Ku-ring-gai, Hornsby Shire, City of Ryde and Hunter's Hill. All are, collectively represented by NSROC. The region is home to a variety of landscapes and communities. These range from scenic waterways, bushland parks and areas of historical significance, through to residential high-rise living, and thriving commercial and retail centres.

Such a large and disparate region provides many challenges to effective environmental management. This is a result of the differing terrain, the significant population, the fragility of the environmental ecosystems and the lack of comprehensive scientific data regarding environmental sustainability.

Community, residential and tourist surveys regularly indicate that a major attraction of the NSROC area is its environmental attributes. These are commonly identified as an abundance of open space, healthy natural ecosystems, mature and substantial urban treescapes, the proximity to national parks and bushland reserves, lack of pollution, and the prevalence of natural water bodies and water ways.

In part, these environmental attributes have made this area of Sydney a popular place to live. It has resulted in steady and significant population growth in recent years exacerbated by the recent property boom. Although most growth has occurred through the consolidation of already developed residential areas or within proscribed commercial and industrial centres, the growth in population, coupled with the ongoing accumulative environmental impacts of more than 500,000 people, has had inevitable environmental consequences.

For this reason the seven NSROC councils, commissioned three studies (completed in 2005) to provide background information, data, recommendations and analysis of issues vital to the region's long-term sustainability. The three studies cover the economic, social and environmental impacts of population growth in the region from a local government perspective and suggest future actions which could ameliorate these impacts. Electronic copies and executive summaries can be viewed at www.nsroc.org

The report commissioned by NSROC on the likely impacts of future population growth on the environment in the region says: "Intensification of the population of the NSROC region will unavoidably impact on the key environmental assets that are highly valued by its residents. Some changes will be manageable, but others will be irreversible." (*The Potential Impacts of a Substantial Population Growth in the Northern Region of Sydney*, Geoff Noonan, Sydney, 2005)

At the same time, new pressures on the NSROC environment have emerged through on-going drought, increased concerns over the risk of bushfires and water quality, the invasion of new pest and feral species, and changing lifestyle preferences such as increased private vehicle use and energy consumption.

Recognising these pressures NSROC has again produced a regional State of the Environment (SoE) report so that appropriate responses and understanding can be developed at a regional, catchment or community level. It will also provide the resource benefits of the seven councils acting in a co-ordinated, collective fashion.

STATE OF ENVIRONMENT REPORTING

Since their inception, the northern Sydney councils have played a central role in managing the environment in close consultation with their communities through specific actions and policies. The relatively recent requirement for councils to complete annual SoE reports underlines both the serious nature of councils' responsibilities, and the necessity for environmental management to be a transparent and regulated process.

An SoE report is one of the corporate reporting responsibilities of NSW local government under the *Local Government Act 1993*. It is intended to provide the community with a report as to what condition the environment is in, why it got that way and what is being done to address the issues. SoE reports are important because they indicate to us what effects we are having on the environment and enable us to manage those effects and make necessary environmental improvements.

According to legislation, an SoE report must:

- Address the eight environmental sectors of land, air, water, biodiversity, waste, noise, and Aboriginal and non-Aboriginal heritage;
- Provide, as a basis of comparison in subsequent reports, a statement outlining the condition of each environmental sector at the date of the report and make the relevant comparison with the equivalent statement in the last SoE report;
- Report on all major environmental effects and related activities, including management plans relating to the environment; special council projects relating to the environment; and the environmental effects of council's activities.

Under recent amendments to the Local Government Act 1993, councils are required to prepare comprehensive reports every four years, with a supplementary report in each intervening year. A regional NSROC SoE report has been completed in each of the past three years. This year (2007-08) is a supplementary report which builds upon the data reported in the previous year.

To reach a stage where a regional SoE report could be produced by NSROC, all of the northern Sydney councils have worked together over the last few years. This was to develop a consistent regional reporting framework and



a set of common indicators appropriate for reporting across local government boundaries. Through time this has proved a significant challenge; while all councils are required to report against key identified environmental issues according to the legislation, each has chosen its own way of interpreting these reporting requirements. They have also gathered data through different methodologies and emphasised different issues according to what is affecting on their environment at a local level.

WHY A REGIONAL SOE REPORT?

The benefit of a regional report is that it enables the community and NSROC to have a greater understanding of the state, pressures and responses to the environment within a regional context. Working together regionally has already yielded benefits including the sharing of ideas on sustainability reporting, the swapping of environmental practices and innovation in the region, and the forging of stronger regional links.

This report structure is designed to meet the requirements of providing an accessible environmental reporting tool for residents and communities of the NSROC area; the needs of councils and councillors in identifying and monitoring key environment issues; and meeting the legislative reporting requirements of the Local Government Act 1993. Each chapter has been constructed around the accepted standard of reporting known as the State-Pressure-Response model used by the Commonwealth and State Governments in their respective SoE reports. An outline of the reporting method is as follows:

State	A description of the current condition of the environment
Pressure	Lists human activities impacting on the environment
Response	The actions that have been taken to address the pressures on the environment

The SoE report uses indicators to monitor change in our environment over time and help to connect social, environmental and economic planning functions to secure a more holistic management focus.

THE FUTURE

The future of local-level environmental reporting in the NSROC region is uncertain. Changes to the Local Government Act heralded by the NSW Government indicate a more integrated model which will no longer require a SoE report to be completed each year will soon be adopted. Instead, it is anticipated that councils will adopt an integrated planning model which combines core elements of sustainability (economic, social, environmental and governance) into a 10-year strategic plan, a four-year management plan and yearly operational plans. The NSROC welcomes this if it delivers more efficient outcomes and is appropriately resourced.

One concern of the NSROC councils is that such a move will reduce the focus on the ecological outcomes of council's activities, as they will no longer be benchmarked through the SoE process. For this reason NSROC completed a Regional Sustainability Plan to help councils moving towards the new planning and reporting model over the next few years. The NSW Minister for Local Government has already indicated that 2009 is a transition year and so much thought will go into how councils plan for and monitor their environments under the new arrangements. It is hoped the momentum developed through the regional SoE reporting model will not be lost and that a regional report on the Sustainability of the Region will be pursued at regular intervals to ensure this regional focus is not lost.

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Towards Sustainability



Environmental sustainability is a framework for integrating economic, social and environmental decision-making into natural resource management. Community and individual concern for the environment and willingness to take action to reduce impacts are vital elements in achieving sustainable outcomes. This is increasingly reflected in the facilitation role councils have adopted in organising and involving residential communities and business interests in environmental programs and actions.

The wide use of the concept 'sustainability' reflects a broad agreement that people living today have an obligation to protect the health, diversity and productivity of the environment for the benefit of current and future generations. This is because a healthy environment is necessary to a productive economy and a healthy society. By definition, unsustainable practices cannot continue indefinitely without degrading current conditions and reducing future opportunities.

Over recent years there has been an extensive effort in the NSROC area to develop new tools and approaches to reduce the complexity of moving towards sustainability and highlight the fundamental links between the economy, society and the environment. The northern Sydney councils operate within the context of ongoing drought and short to medium term concerns regarding: water security, air quality, climate change, flora and fauna protection, waste management, population growth, transport congestion, land availability and degradation, pollution and energy consumption. At no time in the councils' history has the challenge of sustainability been more dramatic or more compelling.

Figure 1: Total Expenditure on Environment by council 2007/08

NSROC council	Expenditure 2007/08 (\$)	Population of LGA (estimate for 2007/08)	Area of LGA (square kilometres)
Hornsby	39,551,051	158,285	509
Hunter's Hill	2,638,904	14,031	6
Ku-ring-gai	15,686,184	106,807	84
Lane Cove	7,596,809	30,426	10
North Sydney	27,940,845	63,440	10
Ryde	39,242,963	96,948	40
Willoughby	27,165,704	68,387	23
NSROC Total	159,822,460	538,324	682

LIMITATIONS

Although there are a number of tools to measure sustainability, they remain limited in their application by the councils as they are complex, inexact and subject to varying interpretation. No councils have formally adopted a set of sustainability indicators for the purposes of SoE reporting and the move towards sustainability must be inferred from secondary sources. For the purpose of this report, two core indicators were identified to indicate the level of sustainability within the region. These are the amount of community and corporate involvement within the region in environmental management activities. The councils are seeking to develop a more comprehensive and robust set of indicators, notwithstanding the inherent difficulty in SoE reporting on socio-economic data sets and information.

CASE STUDY

NSROC Regional Sustainability Plan

The NSROC Sustainability Plan (RSP) was a first for the region and was produced in collaboration with the NSROC Professional Officers Group of representatives of the seven local Councils that comprise the NSROC region. It is based on current and future proposed projects and policies implemented by these seven councils and was endorsed by the NSROC Conference in August 2008. The RSP will assist in guiding future sustainability projects as well as identifying specific gaps and opportunities for further collective action.

The primary purposes of the RSP are to:

- present a shared sustainability vision for the region;
- guide consistent regional alignment on key common issues;
- identify common goals and programmes;
- maximise collaborative learning opportunities and partnerships; and
- guide effective human, fiscal and other resource use by Councils across the region

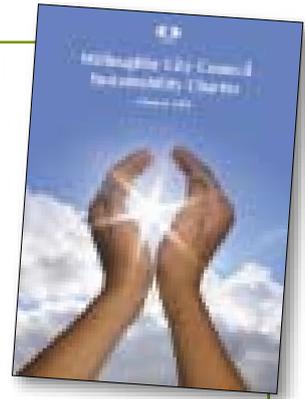
The Regional Sustainability Plan will facilitate progress towards more sustainable attitudes and behaviours through its identification and prioritisation of issues, goals and actions to accelerate progress towards sustainability across the region. It can be viewed at www.nsroc.org



Willoughby Council – Sustainability Charter

The Sustainability Charter was adopted by **Willoughby City Council** in 2008. It sets the sustainability vision, principles and directions for Council. Willoughby is the first Council in NSW to adopt a Sustainability Charter (and possibly in Australia). The Charter is made up of three strands - social, economic and ecological sustainability, but places an emphasis on ecological sustainability as the key strand. The Charter defines what Willoughby means by each of these strands, something that many documents do not do. Sustainability 'principles' are detailed in the Charter, having been drawn from several sources (such as the Earth Charter). The importance of principles lies in the fact that they provide the ethical underpinnings for an organisation,

so that if you know where you are coming from, you may then know where you are going. The Charter directions formalises the broad areas of action that Council will take. The Charter also encourages the community to embrace these principles and our directions. The Charter went out to the community for comment for three months, and an overwhelming positive response was received. The Charter will be followed later by a Sustainability Action Plan that specifies the detailed actions needed under the Charter directions.



CONSULTING WITH OUR COMMUNITIES

Hornsby Shire Council has continued its work with consulting with its community. An online independently moderated site has been established to undertake community consultation to elicit the views of the "silent majority". It has 1170 registered members with 418 people visiting the site over the year. Five open forums were held, allowing community members to raise issues with councillors (365 people spoke). Evaluation reveals a 90 per cent satisfaction level regarding opportunities for involvement by respondents at the forums. The community was surveyed to elicit types of events desired which will influence council's calendar of events.

Ku-ring-gai Council has a strong commitment to engaging its community to shape decisions and gather feedback on services, projects and planning. The council has consulted with its community on the development of a sustainability plan, town-centre planning, plans of management and master plans among a range of other projects that direct services and capital works. Council's formal consultation policy guides its work and ensures all consultation is equitable and accessible. As such it engages its community in a range of ways, though the use of e-registers, community meetings, reference groups and committees that bring together residents, experts and representatives from other government departments. Importantly, the Sustainability Reference Group was established this year. It consists of 15 members who provided input into the development of the sustainability vision report, and directing future council and resident action programs.

North Sydney Council provides residents, students, workers and property owners within the LGA with opportunities to participate in decision-making on issues of both present- and long-term interest in their community. Recent topics include the proposed Sustainability Centre on the coal loader site in Waverton. Council has worked collaboratively with the community to design the centre and its programs. It developed a vision, the objectives, an outline of the programs and worked with the architects to develop the centre's designs. It also developed a business plan which will help guide how:

- the centre will function and operate
- education programs will be effectively run
- the centre will be marketed and promoted
- it will also help determine what staff will be required.

Hunters Hill Council regularly invites the community to provide comment and feedback on its direction and decisions. Recent community participation in decision-making has involved the Hunters Hill Village Masterplan, the Cultural Precinct Plan In the acquisition of *The Priory*, the development of an urban design strategy, a community facilities review, a community sustainability survey, the provision of a skating facility and a review of the Gladesville Reserve Plan of Management. As well as these specific events, the council runs many committees that cover issues affecting the community – including traffic, transport, parking, bushland, sustainability, disability access, trees, memorials, events, arts and craft, seniors, and children.

Lane Cove Council – Draft Local Environment Plan

In 2007-08, **Lane Cove Council** undertook extensive community consultation during the development of the draft local environment plan (DLEP). The challenge was to prepare the Lane Cove community for inevitable change, and the increase in residential densities imposed under the NSW Government's Metropolitan Strategy – a vital issue for the community to know about.

A major innovation was the development of 10-point sustainability criteria. These were developed and used to prioritise sites for residential growth within the municipality, and included proximity to public transport, employment, recreation, services and shops, the character of existing areas, and traffic implications.

Lane Cove Council also used a number of other strategies to consult with the community including:

- a detailed interactive website
- a series of public workshops
- a DVD to explain the LEP
- regular email updates
- letters to residents
- newspaper advertisements
- a telephone hotline
- a number of Council staff for consultation every day during the exhibition period.

Lane Cove Council received a significant response from the community, with more than 840 submissions made. In recognition of this work, the council was presented with the Morpheum RH Dougherty Award for Excellence in Communication at the Local Government Week Awards Evening for 2008. The DLEP was adopted on August 4, 2008.



Residents at community consultation workshop

City of Ryde is committed to engaging with residents, businesses and stakeholders as it plans services, policies and facilities. The council has been developing an improved approach to how it engages and did this with the help of a council-wide project team which included staff from all major delivery areas across the organisation. Extensive research on best-practice approaches to stakeholder engagement combined with staff consultations, which included interactive approaches such as a world café and I-Forum. The engagement framework provides a clear process for how council will decide if engagement is necessary, who to engage with – and how – and will allow the community and stakeholders to know what to expect from engagement processes, and how to participate. The framework will also improve the decision-making, planning and implementation of council services, facilities, plans and policies.

COMMUNITY ACTION

Councils are required to consider the principles of sustainability in their decision-making processes (*Local Government Act, 1993, s 7e*). Accordingly, throughout this SoE report there are references to a range of projects NSROC is undertaking to address sustainability.

The councils run a large number of community programs aimed at achieving environmental sustainability in specific issues such as water conservation, bushland management, energy reduction and waste minimisation. Some of these programs are run as part of council operations, and others are funded through specific grants and environment levies.

Some of the projects undertaken throughout the region in 2007/08 are as follows:

Hunter's Hill Council supports its community and associated groups in their efforts to take action for the environment. In August 2007, the council supported the Hunters Hill Trust in its showcase presentation Greening Your Home Without Breaking The Bank. The presentation was delivered by Peter Meloy and provided community attendees with some simple actions to save energy and reduce greenhouse gas emissions around the home. Hunters Hill Council also supported Boronia Park Public School with its inaugural Eco-Festival – a great success that attracted residents from the Ryde and Hunters Hill areas. The environmental orienteering course around the school grounds provided an interactive learning opportunity where kids learnt to value their local environment and animals within it.

The **Ku-ring-gai** community has been involved in developing a sustainability vision and strategy for the region in two ways: through a visioning exercise and through action planning workshops where

Ku-ring-gai Sustainability Plan

The Ku-ring-gai Global Sustainability Strategy incorporates a number of projects which take into consideration the quadruple bottom line (QBL) and is designed to provide outcomes and data consistent with the Global Reporting Initiative (GRI) system. The strategy provides direction to the council by improving community consultation, building partnerships and sustainability networks, providing continuous educational opportunities and integrating with council's future management plans.

It will help in providing more efficient and sustainable services and functions internally and to the wider community. To date, a comprehensive community and staff consultation process has been undertaken. Once the strategy is implemented it will form the basis of a long-term sustainability performance and reporting system that aims to bring all initiatives under one strategic sustainability program.

Following the formation of a long-term community and council vision, Ku-ring-gai is now developing



an action plan as the next stage of its sustainability strategy. In May and June 2008, residents of all ages came together in a series of forums to share their ideas on how to make theirs a leading sustainable community. A total of 747 actions were suggested by participants. Preparation of a draft report was expected to be complete by October 2008.

opportunities, programs, projects and policies for council and partners over the short- (five years) and long-term (25 years) were identified.

Lane Cove Council, in partnership with the Australian Conservation Foundation, successfully delivered the GreenHome sustainability workshop series in early 2008. Eighty residents learnt practical ways to save water and energy, and reduce waste and consumption. In an exciting development, two new community action groups formed as an outcome of these workshops. The council also successfully held the first Sustainability Lane in 2007. This event showcased sustainable living ideas through stalls, workshops and entertainment. The council celebrated International Compost Awareness Week through half-priced compost bins and worm farms, as well as an information stall in Lane Cove Plaza.

North Sydney Council has conducted a number of environmental programs including sustainable living workshops, school stormwater education programs and GreenSchools grants. Education about the environment and the opportunity for action in the local area is also offered through the Bushcare, Adopt A Plot and Streets Alive Programs. At the coal loader site, community involvement has led to the development of a community garden and plans for a plant-propagation nursery. A number of groups are already using the community garden, including a school project for developing healthy eating practices. Future plans include using the nursery-propagated plants on bushcare sites.

North Sydney Council has also promoted community action by providing two series of sustainable living workshops, covering topics as diverse as GreenPower purchase choices, worm farming, green cuisine, composting and natural cleaning options. These workshops have been well received and attended by community members.

City of Ryde recently produced a sustainability DVD called Sustainability in Ryde – Teaching Today's Children For Tomorrow's Future, which canvases sustainability topics such as waste, water, energy and biodiversity. In 2008, the DVD was made available to all schools in the Ryde community and has proved to be a valuable resource. The council also runs continuous sustainability education workshops for the community and attends local community and school fetes and expos promoting sustainability in Ryde. The community is actively involved in sustainability initiatives, including reducing greenhouse gas emissions. A sustainability home audit program conducted in 30 homes throughout Ryde in 2008, resulted in the reduction of the total electricity consumption of participating residents by 10,196 kWh equivalent to 10.93 GHGt a year. Residents saved an average of 340 kWh from their electricity bills.

Hornsby Business Energy Savings Program

The aim of the Hornsby Business Energy Savings Program is to help **Hornsby Council** meet its community reduction target of 5 per cent by 2010. This program intends to work with 200 businesses over an 18-month period to achieve a total greenhouse gas reduction of 3000 tonnes of CO2 equivalent a year.

Through an extensive expression of interest process, the council challenged the private sector to deliver a new approach to existing business engagement models, one that had more focus on business needs and actual implementation, rather than behavioural change and auditing. Council also wanted to improve interdivisional working relationships and identified the pressing need to focus on collaboration between the environment and economic development units to fight climate change and minimise the impact our local businesses are having on the environment.

In the first two months alone, 79 businesses joined the program, which is on track to deliver a forecast \$1.4 million contribution of investment into the local economy and 3000 tonnes CO2 equivalent in the first year alone. Other outcomes of the program include:

- Improved energy efficiencies within the business sector
- Increased, broad community participation in decision-making, actions and practices for a sustainable future
- Strengthened partnerships and learning between council and the wider business community towards sustainability
- Opportunities for local infrastructure investment and opportunities



Willoughby City Council has been working with its diverse community to encourage the community to incorporate sustainability living ideas. Council worked with the Ethnic Communities Council and with the help of the WSN Environmental Solutions' Environmental Heroes grant, delivered a series of workshops to a number of community groups such as the Korean Open Door Cultural Society. The series focused on a number of areas, including waste, energy conservation, water conservation, non-toxic cleaning, biodiversity and stormwater pollution. A highlight was a tour of the UR-3R facility at Eastern Creek which processes 50 per cent of the Willoughby area's household waste. The facility uses innovative technology to capture biogas (methane) from waste which not only produces green electricity but also reduces greenhouse gas emissions significantly.

Hornsby Council ran many programs throughout 2007-08 to promote sustainability throughout the shire. These included an Eco Festival in March (attracting more than 3000 people), the bushcare and community nursery volunteer program, e-waste collections, chemical cleanouts, a successful trial of light bulb recycling, 18 free vegetation chipping days for residents to turn their garden waste into mulch, four meetings for the Hornsby Environment Network for Schools (a program designed to help the implementation of sustainability initiatives in schools and curriculum), a business energy savings program (see above), an earthwise-at-home program assisting residents to install insulation, the promotion of solar hot water and solar power systems through workshops and rebates, the promotion of the fridge buyback program, and delivering a variety of workshops on composting, chemical free cleaning, native gardens and rainwater tanks.

CORPORATE ACTION

The northern Sydney councils have progressively adapted their corporate management structures to accommodate the move towards sustainability. Each council has adopted a number of mechanisms to ensure that operations of councils not only focus on achieving sustainability but also provide opportunities for staff to achieve environmental outcomes. This is in day-to-day commercial transactions, business activities and procurement practices.

Each year, councils prepare management plans that identify what a council will do over the next four years in terms of social, environmental and economic outcomes. The management plan incorporates council's strategic planning,

as well as a detailed budget for the first year and an assessment of the council's longer term financial position.

Councils work in an environment of constant financial pressure because of on-going rate pegging, cost shifting and an expansion in the service expectations of their communities. The following pressures affect council's ability to implement sustainable outcomes in creating and delivering their corporate management plans:

- Competing community interests
- Decreases in government grants as a percentage of total income
- High demand on available council resources
- Rate pegging limits
- Limited opportunity for rating of commercial properties
- Heavy reliance on rates and annual charges as a percentage of total income

Councils have been active in developing long-term management frameworks and goals which help their communities and council achieve long-term sustainability outcomes. Many have joined entities such as the Every Drop Counts program run by Sydney Water and the International Council for Local Environmental Initiatives (ICLED) which identify specific corporate requirements and actions to introduce sustainable resource use into council activities.

Hornsby Council has implemented many programs to ensure it has its own house in order in terms of environmental performance. Thirty two programs have been implemented in the process towards sustainable corporate governance. These include Green Procurement, Carbon Neutral Feasibility Study, Climate Change Adaptation Program, Triple Bottom Line decision making, Fleet Management Study, Business Energy Savings Program, Sustainable Total Water Cycle Management, waste minimisation and Stage II of the Energy Performance Contract.

As part of the development of the Hunters Hill Council Sustainability Plan – Towards a sustainable Hunters Hill – the council underwent an internal sustainability review. The review was completed using the Sustainability

CASE STUDY

City of Ryde Sustainable Procurement Initiatives

City of Ryde adopted its first Sustainable Procurement Policy in 2007 and has committed to

- Give preference to environmentally sustainable products; in making procurement decisions between comparable conventional and environmentally preferable products there is an acceptable price difference allowance (10 per cent to a maximum of \$15,000)
- Use life cycle costing in major procurement decisions (greater than \$150,000)
- Consider general sustainability issues such as running costs, biodegradability, locality, ethical sourcing and the minimisation of waste (avoid, reduce, reuse, recycle), greenhouse emissions and packaging.

Creating corporate sustainability through the use of a dedicated policy was an important objective of the council to provide a basis for the uniform implementation of sustainable procurement processes across the City of Ryde. A significant objective of the policy and its adoption throughout the council was to foster strong management and staff support and understanding of sustainable procurement. Therefore policy was designed to flow from the council's management plan reporting system.



The development of the sustainable procurement policy, team and associated implementation plan was influenced by the council's ongoing commitment to sustainability. It was particularly driven by the council's procurement, environment and waste unit areas and inspired by help from the recently formed LGSA Sustainable Choice program. Programs the council is involved with which support and encourage this project include Cities for Climate Protection (CCP), Water and Energy Saving Action Plans and associated projects and community (including school, local business and CALD groups) and corporate education strategies.

Health Check (SHC) developed by Sustainable Futures Australia (SFA) for the NSW Local Government Managers Association (LGMA). The SHC assessed the extent to which sustainability principles are understood and used in council's social, economic and environmental decision making and involved all staff members. The SHC helped in the development of the major strategic areas, goals, outcomes and strategies contained within the Hunters Hill Council Sustainability Plan.

Ku-ring-gai Council conducted a climate survey for the second time in October 2007 with an incredible 93 per cent response rate. Although some areas require further attention, this survey showed significant improvement over many 2006 results, including:

- Organisational commitment – the number of staff that identified a commitment to the council's vision and objectives improved 6 per cent
- Customer satisfaction – improved 16 per cent
- Organisation objectives – awareness of the objectives improved 18 per cent
- Results and outcome focused goals have improved 12 per cent.

In 2007, the **City of Ryde** formally adopted a sustainable procurement policy and dedicated a policy team to implementing it. The Sustainable Procurement Team meets monthly, and at each meeting a representative from a different council is invited to discuss procurement in their area. This enables the team to collect information from different areas and explore ways of implementing sustainable procurement across the board. The meetings also help build momentum, keep the team focused, and provide a forum to help engage new staff. To date Ryde's policy implementation includes gathering baseline procurement data from different areas of council activities, switching from virgin to recycled copy paper, securing a recycled content stationary products database, implementing staff workshops on sustainable procurement and identifying key staff champions, investigating improved water and energy efficiency in Council buildings and changing office consumables to more socially and environmentally sustainable options.

In 2007 **Willoughby City Council** renewed its vision of working towards sustainability. This involved the appointment of a new Director of Sustainability Projects and producing the council's first sustainability charter. This new direction changed the focus from an environmental levy to a sustainability levy with an emphasis on climate change and was in response to its community's request to limit the ecological footprint of the Willoughby LGA. This request was made clear in the Willoughby City Strategy developed through extensive public consultation in 2006. To better equip it to develop and deliver appropriate sustainability programs to meet this community expectation, council identified the need to apply for a new sustainability levy to replace its environmental levy due for expiration in June 2008.

Willoughby City Council undertook extensive public consultation to demonstrate to the Department of Local Government that its community supported the introduction of a new sustainability Levy of \$4.25 million to finance its proposed sustainability programs.

North Sydney Council is a partner in the CitySwitch Green Office (previously known as the CBDs Greenhouse Initiative) a program that encourages tenants in commercial office buildings to reduce energy consumption. The program is run in partnership with the cities of Sydney, Parramatta, Melbourne, Perth and Adelaide and state government agencies. A total of 14 businesses in North Sydney are involved in the program. As well as an internal sustainability working group has been established to integrate sustainability into North Sydney Council's decision-making, processes, planning, reporting and operations through its Organisational Sustainability Program. This includes undertaking development of a sustainable assessment toolkit to ensure that sustainability thinking is a part of decision-making processes at the council. North Sydney Council will also undertake policy reviews as part of the Organisational Sustainability Program to ensure they align with sustainability goals.

Lane Cove Council has undertaken several water and energy saving initiatives at council facilities in 2007-08. The administration centre, library and Lane Cove Plaza are all powered by 100 per cent GreenPower. The greenhouse gas emissions from council's vehicle fleet have been offset through participation in the Greenfleet program. Rainwater tanks have been installed in Kindy Cove Childcare Centre, Birrahlee Kindergarten, Lane Cove Occasional Childcare and the new girl guide hall. Some exciting initiatives have occurred at the Lane Cove Aquatic Centre, including the installation of photovoltaic cells, and a pool blanket to reduce evaporation and heating needs.

In February 2008, **Lane Cove Council** installed a device known as the Ark on its light and power circuit, becoming the first council in Australia to do so. After achieving reductions above those estimated, the council installed a second Ark on its mechanical services circuit. Although there are monthly fluctuations in the energy consumed by the administration centre, the Ark saves the council an average of 10 per cent across all electrical equipment.

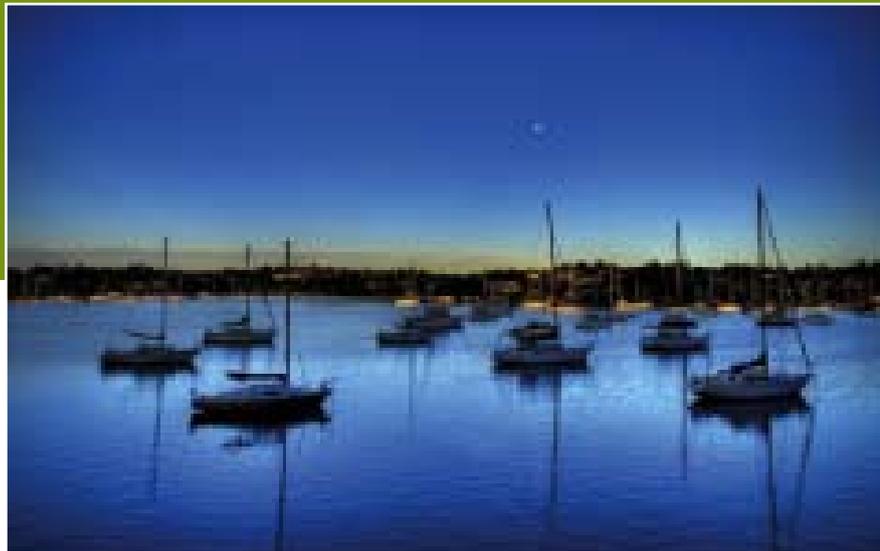
Human Settlement

The history of non-indigenous settlement in the region starts immediately after Sydney was first colonised in the late 18th century.

However substantial settlement did not occur until almost 100 years later. In this period, development followed the railway lines and the main arterial roads linking Sydney city with the small settlements on its outskirts.

More recently, the NSROC area, like the rest of Sydney, has been under substantial and continual pressure to accommodate a rapidly growing population. Regional residents have been active in ensuring that the natural heritage values of the region are protected and managed sustainably in the on-going push for further urban consolidation.

The high property values in the NSROC region are partly a reflection of the region's success in retaining outstanding environmental attributes and ensuring a comprehensive integration of heritage, open space and bushland into the built environment. *(NSROC Regional Social Report, Gail Le Bransky, Sydney 2005)*



URBAN DEVELOPMENT

In the northern and north-western parts of the northern Sydney region, development is constrained by the natural topography and extant bushland preservation areas. Historically, urban development proceeded along the ridgelines, with the steeper areas adjacent to the Hawkesbury River and its tributaries remaining undeveloped except for small residential settlements and commercial hubs supporting water-based commercial activities. Although some former rural areas have been developed for residential purposes, large areas within the **Hornsby Shire Local Government Area** (LGA) have remained primarily rural. The high cost of delivering urban infrastructure, and the importance of maintaining productive agricultural lands are major impediments to urban growth in these areas.

In the southern parts of the NSROC area, the recent property boom has continued the pressure for further urban consolidation in the region and made housing affordability a significant issue. In April 2004, the NSW Premier announced the development of a metropolitan strategy to guide Sydney's growth in the coming 30 years. The strategy anticipates growth of about 40,600 people a year over this period – two thirds by natural growth, the remainder by immigration from overseas and interstate. (*Le Bransky 2005*)

The Pressure of Growth

The NSROC area itself is experiencing unprecedented growth. State strategic land-use policies such as the Metropolitan Strategy appear set to challenge the region's historical growth patterns and values. The strategy, announced by the State Government in 2004, has set growth targets for all of Sydney and divided these targets into regions. The proposed growth target for the NSROC region is 51,000 households which equates to about 130,000 people over the 25 years of the Metropolitan Strategy. The first iteration of the strategy, released in December 2005 and called City of Cities identified seven strategies to guide the estimated growth of 1.1 million people over the strategy's 25 year time frame. These are economy and employment, centres and corridors, housing, transport, environment and resources, parks and public places, and implementation and governance. The second iteration – the more detailed descriptions of where growth would occur, where jobs would be created and how such growth would be sustained – appeared in sub-regional strategies released in late 2007 and early 2008.

Two sub-regional strategies which cover the NSROC region are the Inner North Sub-regional Strategy (North Sydney, Lane Cove, Ryde, Mosman, Willoughby and Hunters Hill) and the North Sub-regional Strategy (Ku-ring-gai and Hornsby). Although the documents were developed with some consultation with local Government, they were created and owned by the State Government. The final iteration of the Metropolitan Strategy was through the revision of the Local Environment Plans (LEP) of each of the NSROC councils. The State Government directed that every council in NSW must create a new LEP in accordance with a standardised template and must conform to the objectives and directions of the relevant sub-regional strategy. As the LEP is the principle strategic planning document for local government, this process will ensure uniformity across the region for all councils covered by each individual strategy.

The first of the NSROC sub-regional plans, the Inner North Subregional Strategy, was released in July 2007 and was exhibited by the Department of Planning for 60 days. This plan identifies the infrastructure commitments made in the State Infrastructure Strategy (SIS) which are relevant to the region, as well as setting housing and employment targets, and major planning actions and directions. The targets include 30,000 new dwellings and 60,000 new jobs by 2031, and this growth is expected to occur through urban consolidation.

Figure 2: Dwelling targets and employment capacity targets for the Inner North Subregion, Department of Planning, 2007.

Local Government Area	Dwelling Target	Employment Capacity Target
Hunters Hill	1,200	300
Lane Cove	3,900	6,500
Mosman	600	1,300
North Sydney	5,500	15,000
Ryde	12,000	21,000
Willoughby	6,800	16,000
Total	30,000	60,100



Although strongly supporting a regional strategic planning process for Sydney's growth, NSROC has consistently expressed concerns regarding the limited amount of infrastructure provision identified in the overall Metropolitan Strategy and the draft sub-regional strategy that has now been released. NSROC's concern is that the infrastructure is inadequate to sustainably address the growth envisaged in the strategy, particularly as growth targets are identified for a 25-year period, but infrastructure is only identified for the next 10 years under the SIS. The NSROC councils remain in the invidious position of having to plan for 30 years of population growth with the commitment of only 10 years worth of infrastructure.

NSROC is also concerned that the environmental actions identified in the Inner North Sub-regional Strategy are insufficient to protect the environmental heritage and ecological communities of the region. The sub-regional

strategy does not have an implementation plan which identifies responsibilities, performance indicators, budgets and timetables. As a result, doubts remain regarding its effective implementation. It is hoped that revision of the Draft Inner North Subregional Strategy and the imminent release of the North Subregional Strategy will allay these concerns.

The Metropolitan Strategy makes it clear that under significant population pressure, urban development must proceed carefully to ensure environmental effects are managed, and while this will be assisted by a regional plan which posits growth in already developed centres, it remains one of the greatest challenges for the region's councils.

Urban Development and Construction

There is a wide diversity of land uses and urban development pressures across the northern Sydney region. In North Sydney there is on-going construction of high-rise commercial and residential buildings, while in Hornsby there is pressure on productive rural lands to be developed for new residential subdivisions. Within all councils there is an on-going process of urban consolidation in response to government policy, property prices and population growth.

The nature of housing stock is also changing – from traditional large detached dwellings on big, leafy blocks, to higher density houses which now take a larger portion of the block. As the size of families decreases and more people live alone, there has also been a corresponding rise in the number of one-bedroom and studio apartments. Overall, the value of property in the region remains high and housing affordability remains low, limiting the socio-economic spread within the community.

Much residential intensification has taken place in existing commercial zones, especially around railway stations. For example, St Leonards was rezoned in 2001 from a low-scale industrial and commercial centre to a mixed-use zone. This brown field rezoning has allowed wholesale redevelopment of the area into a medium- to high-rise commercial and residential centre with significant increases in the working and residential populations. Significant urban redevelopments also have occurred adjacent to rail stations in Chatswood and West Ryde.

Figure 3: Number and type of development applications (DAs) in the NSROC area, 2007/08

Council	Number of Commercial DAs	Number of Industrial DAs	Number of Residential DAs	Number of Aged Persons Housing DAs	Other
North Sydney	371	0	488	0	0
Lane Cove	42	15	381	1	160
Hunters Hill	8	0	179	0	0
Ryde	299	21	814	2	76
Ku-ring-gai	110	0	1,113	6	11
Hornsby Shire	145	36	1716	22	261
Willoughby	259	45	524	1	50
NSROC region	1,234	117	5,215	32	558

Figure 4: Number of new dwellings in the NSROC region, 2007/08

Council	Number of New Dwellings
North Sydney	29
Lane Cove	35
Hunters Hill	13
Ryde	479
Ku-ring-gai	621
Hornsby Shire	390
Willoughby	65
NSROC region	1,632

Figure 5: Average number of people per household in the NSROC region

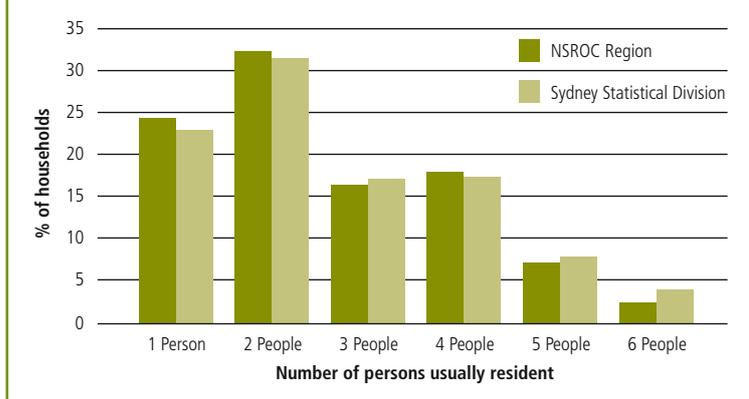


Figure 6: Percentage of land use by LGA in the NSROC region, 2007/08

Council	Business	Industrial	National Park	Open Space	Residential	Roads	Special Uses	Rural	Unzoned	Other
North Sydney	6.3	0	0	16.8	44.7	25.1	5.4	0	0	1.7
Lane Cove	1.5	6.1	0	15	51.8	19.6	5.8	0	0	0.3
Hunters Hill	3	0	0	13	50	17	17	0	0	0
Ryde	3	4	6	9	47	18	12	0	1	0
Ku-ring-gai	0.6	0	19.7	16.5	43.9	12.2	3.7	0	0	3.4
Hornsby Shire	0.4	0.4	49.9	5.2	9.4	No data	3.3	15.7	No data	15.7
Willoughby	2.4	4.3	0.4	20.1	49.4	18.2	4.5	0	0	0.8

Responding to the Impacts of Development

In the past, both local residents and councils in the northern Sydney region have reacted strongly to the NSW Government’s attempts to impose blanket policies aimed at increasing urban consolidation. These seek to maximise infill through dual occupancy and allow three-storey apartment buildings in most residential areas. The strength of the backlash in many parts of Sydney forced the NSW Government to abandon these policies and to limit blanket urban consolidation to lower density townhouse and villa development. Even this level of development is strongly contested in many parts of the NSROC region and significantly restricts the scope for urban consolidation in residential areas. (*Le Bransky 2005*)

Councils in the region are working closely with their communities and the State Government to plan future growth. The actions of the State Government in responding to pressures of development have been described in the preceding section. A key initiative has been the development of the Metropolitan Strategy to guide growth in Sydney over the next 30 years. NSROC and the seven councils have been working closely with the Department of Planning to develop the strategy and the corresponding sub-regional strategies. The NSROC councils have also procured a number of reports to answer issues associated with the economic, environment and social development this anticipated population growth entails. The councils are also planning for growth in their own localities and have produced a wide array of planning instruments and policies to achieve sustainable growth, or to limit growth where it is becoming unsustainable.

NSROC has also completed a Northern Sydney Sub-Regional Planning Strategy, which provides overarching direction and policies for development at a regional level, as well as identifying infrastructure needs and opportunities over the next 30 years. This strategy covers the period 2004-31, and sets regional- and council-specific housing and employment targets at 10-year intervals for the period of the Metropolitan Strategy as well as identifying major infrastructure projects which will help make the proposed population growth possible. This document has been exhibited by the NSROC councils and adopted by the NSROC Board, and can be viewed at www.nsroc.org.

The Sustainable Building Index (BASIX)

Introduced by the NSW Government, BASIX is an online program designed to ensure homes are built to be more energy- and water-efficient. BASIX uses information such as site location, house size, type of building materials and fittings for hot water, cooling and heating and compares the design performance against energy- and water-reduction targets. The design must meet these targets before a BASIX certificate can be printed and a new development approved. Every development application for a new home must be submitted to the council with a BASIX certificate and the outcome is better-quality homes that are more suited to the environment and less expensive to run. BASIX also provides greater market certainty for sustainable industries and standardises domicile environmental performance across the state. Examples of sustainable housing features that help in obtaining a BASIX certificate include:

- Rainwater tanks
- Water efficient showerheads, taps and toilets
- Grey-water systems
- Indigenous garden species
- Cross ventilation
- Good solar orientation
- External shading
- Ceiling fans
- Energy-efficient lighting
- Insulation

Over time, it was anticipated that BASIX would apply to new apartment and unit blocks and then be applied to upgrades and redevelopments of existing buildings. It remains unclear whether the State Government is committed to introducing the wider application of BASIX in this manner.

The NSROC councils are working to adapt their planning instrument and development-application approval processes to complement the introduction of BASIX as well as implementing projects to help homeowners achieve BASIX certification. The planting of Australian native plants can add to the BASIX score, and the North Sydney Council's Native Havens Program can help by providing free native plants and offering advice on ideal native plants to select.

Hornsby Shire Council in February 2007 approved a sustainable building element for insertion in the dwelling-house, and low-, medium-, medium/high- and high-density multi-unit housing, business lands, rural lands, river settlements, Brooklyn and Dangar Island development control plans (DCPs). The element promotes development that reduces potable water and energy consumption, and results in the improvement in a residential building's thermal performance. The element also includes both applicant and council responsibilities concerning BASIX requirements at the design, lodgement, assessment and determination stages of a development proposal affected by the code. The council also endorsed an erratum for insertion in its exempt and complying development DCP to identify BASIX requirements.





POPULATION DISTRIBUTION

The size, rate of increase and settlement patterns of the NSROC population influence the extent of environmental impacts within and outside the NSROC region. Changes in land uses for human purposes can damage natural ecosystems, and alter air and water cycles. Population growth is also associated with a range of other issues, such as energy consumption, transport and waste management.

The Challenge of Population Growth

Population growth and the associated planning for increased development is the major pressure facing the region in environmental terms. Historical evidence repeatedly demonstrates that there is a strong correlation between urban population growth and a reduction in the ability to protect important local environmental assets. More building usually means less natural soil coverage, greenery, tree canopy cover, and increased impacts from stormwater run-off and wind. It also means less natural sunlight at ground level.

The impacts of population growth vary according to the patterns of human settlement and the sensitivity of the different receiving environments exposed to them. Settlement may:

- Threaten the survival of highly valued plant or animal species
- Degrade the quality of the water or air vital for the safe and sustained survival of all life in the region
- Result in an increase in intrusive noise
- Destroy the aesthetic appeal of the area.

Urbanisation that occurs past the capacity of the infrastructure to reliably provide drinking water, sewerage management, stormwater management and electricity can also generate significant environmental health threats. (Noonan 2005)

Population Data for the Region

Below are estimates of the population of the NSROC region based on figures provided by the Australian Bureau of Statistics (ABS). Although the region has experienced significant growth in the past decade, the data illustrates that population growth is slowing. This may be as a result of the overall decline in the housing market in Sydney which has resulted in fewer new domiciles being constructed. It may also be influenced by the region's changing demographics, with high property prices meaning fewer families moving in, and thus household size (and hence total population growth) is decreasing. The 2005 ABS data indicated a pronounced dip in population growth. However, 2006 data indicates that, for the first time in six years, the rate of population growth is increasing from the previous year.

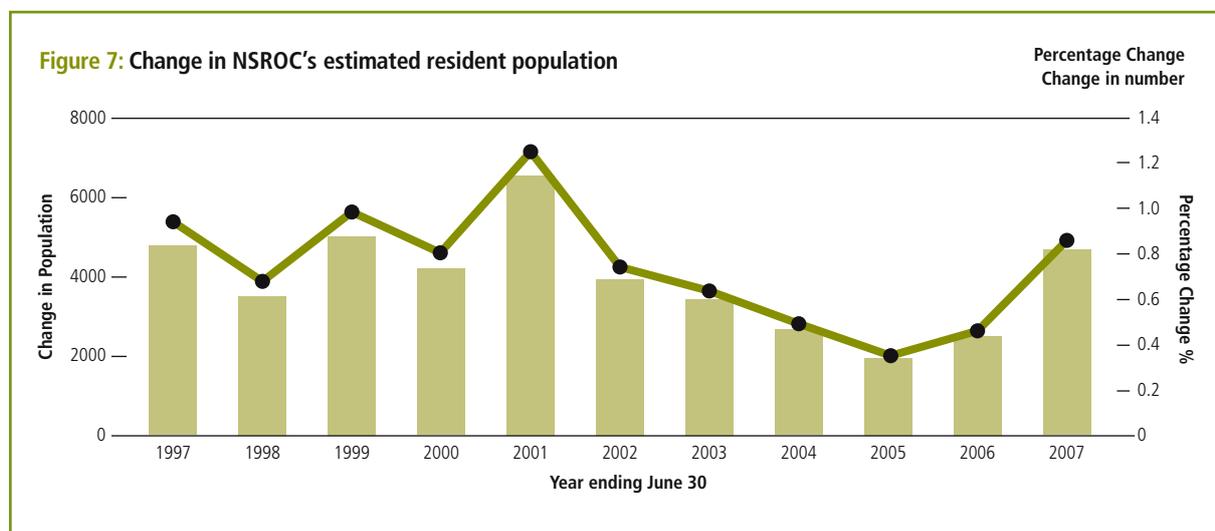


Figure 7: Australian Bureau of Statistics

Responding to the Challenge of Population Growth

As part of the State Government's Metropolitan Strategy, regional strategies are being developed by the Department of Planning (DOP) to inform the overarching policy directions, and to provide substantive detail in regards to housing, employment and infrastructure provision.

Two sub-regional strategies covering the NSROC region are being produced by the Department of Planning. These cover the north (Ku-ring-gai and Hornsby) and the inner north (Willoughby, Ryde, North Sydney, Lane Cove, Hunters Hill and Mosman). Combined, these strategies are expected to set a target of 51,000 new households and more than 60,000 new jobs over the next 25 years. The Department of Planning and each of the NSROC councils have already exhibited the inner-north sub-regional strategy, and the NSROC lodged a submission raising a number of concerns. Among these were the absence of adequate infrastructure provision to accommodate anticipated growth, the absence of an implementation plan attached to the strategy giving clear timelines and responsibilities for delivery, and a lack of detail regarding major issues such as housing affordability, environmental sustainability and public transport provision.

The north sub-regional strategy was released in late 2007. Although local government has been consulted in the process of developing the sub-regional strategies, councils still have a number of concerns, including whether:

- there will be adequate provision of infrastructure identified in the strategies,
- housing targets are achievable
- councils have any potential to influence job-creation in their localities under existing governance and funding arrangements.

Although the process is not complete, it is anticipated that a regionally planned approach to population growth, rather than ad-hoc or simplistic approaches used previously, will greatly help in reducing the effects of population growth. In a report on the environmental impacts associated with population growth as identified under the metropolitan strategy, the consultant concluded: "Intensification of the population of the NSROC region will unavoidably impact on the key environmental assets that are highly valued by its residents. Some changes will be manageable, but others will be irreversible." (*Noonan 2005*)

The NSROC councils have also completed their own regional strategy, identifying major planning policies and issues in the region and setting them against the context of the proposed employment and housing growth in the area over the next 25 years. The NSROC regional strategy identifies lower population targets for the inner-north region than those posited by the Department of Planning. The inner-north councils contend that their targets are more realistic, as they have been developed in consultation with their communities, and take into account the natural, heritage and infrastructure constraints of the region. The challenge for the NSROC councils is to ensure that irreversible changes are managed as much as possible in an environmentally sustainable manner.

ABORIGINAL HERITAGE

Much of what we know about the lives and cultures of the people of the Sydney region before British colonisation comes from many sources. There are written descriptions, oral histories, drawn and painted illustrations, objects collected by the earliest colonists and visitors to Port Jackson in the late 18th and early 19th centuries, as well as the archaeological record.

When the British arrived in January 1788, there were more than 1500 Aboriginal people living in the area from Botany Bay to Broken Bay, and as far west as Parramatta. They belonged to many peoples, including the Gadigal, Wangal, Wallumedegal, Boromedegal, Gamaragal, Borogegal, Birrabirragal and Gayamaygal. They spoke languages now known as Darug, Dharawal and possibly Guringai. To the south-west, Gundungurra was spoken, and to the north-west of the Hawkesbury River, the language was Darginung.

The original inhabitants of the NSROC region were people from the Camaraigal, and Gorualgal clans of the Guringai family group and the Wallumedegal clan in the Ryde area. The Guringai people lived largely along the foreshores of the harbour and river estuaries. Evidence of their living areas occur throughout the region in the form of rock art and rock engravings, middens, artefacts, water holes, ceremonial grounds, carved trees, stone quarries, stone arrangements, ochre quarries and axe grinding grooves.

Threats to Aboriginal Sites

Threats to Aboriginal heritage sites come from development, damage due to ignorance of the sites, excessive visitation, vandalism and erosion.

CASE STUDY

Aboriginal rock engravings unearthed – North Sydney Council

The archaeological excavation at the coal loader site at Waverton has uncovered Aboriginal rock engravings. Four engravings thought to be thousands of years old have been found. One depicts a man. Another depicts a fish. And there are two images of the “spirit man”. These newly discovered carvings add to the existing engraving believed to be a picture of a whale. Organisers anticipate more rock carvings will be discovered soon.

The archaeological dig is being carried out by **North Sydney Council**, with the help of the Northern Sydney Aboriginal Heritage Office and the Sydney-based Indigenous Boxing Academy. North Sydney Mayor Genia McCaffery said the engravings would be preserved and accompanied by interpretive signage. “This is an example of practical reconciliation, and illustrates our intentions for the whole coal loader site, which is described by the phrase ‘Learn from the Past – Embrace the Future’,” Mayor McCaffery said.

Hundreds of members of the indigenous and local communities attended the Aboriginal Archaeological Dig ceremony at the coal loader site on Saturday

June 28, 2008, witnessing first-hand the engravings being unearthed as well as hearing from Rob Welsh, chairman of the Metropolitan Aboriginal Land Council, Professor Michael McDaniel, Dean of Indigenous Education at the University of Western Sydney, David Watts, from the Aboriginal Heritage Office, and Alex Wymarra, manager of the Indigenous Boxing Academy. Entertainment was provided by didgeridoo player Billy MacPherson and Indigenous band Freshwater.



Aboriginal Sites within the NSROC Region

The following figure indicates Aboriginal sites across the region.

Figure 8: Aboriginal Sites in the NSROC area, 2008

Council	Identified Aboriginal sites	Registered Aboriginal sites	New sites under investigation
North Sydney	68	68	0
Lane Cove	91	69	4
Hunters Hill	72	72	0
Ryde	14	59	1
Ku-ring-gai	92	80	0
Hornsby Shire	235	235	0
Willoughby	152	152	0
NSROC Region	724	735	5

Preserving and Protecting Aboriginal Sites

NSROC councils have developed a number of strategies aimed at preserving the area’s Aboriginal heritage. Comprehensive registers of sites throughout the region provide information crucial to site management. North Sydney Council’s register provides specific recommendations regarding conservation and the management of sites. It also includes protocols for council assessment officers in dealing with development applications near an Aboriginal site.

Stage I of the Bar Island Aboriginal and European heritage conservation project has been completed with **Hornsby Shire Council**. The Metropolitan Local Aboriginal Land Council undertook the Aboriginal site survey, and the path was upgraded to minimise erosion of the midden.

Hunters Hill Council is a member of the Northern Sydney Aboriginal Social Plan Steering Committee and has contributed towards the cost of employing a project officer to implement the plan. Council continues to maintain and protect the 72 listed Aboriginal heritage sites in its Municipality.

Staff from the Aboriginal Heritage Office (AHO) conducted many training and educational activities for staff, schools and the wider community in Willoughby LGA. They also supported the author of an *Aboriginal History of Willoughby*. **Willoughby City Council** supplied and fitted out the new office for the AHO at Northbridge, which also houses a training room and exhibition space.

NON-ABORIGINAL HERITAGE

'Heritage' refers to the culture, traditions and national assets conserved from one generation to another. A conservation area is a place of aesthetic, social and historic value to the community. In practical terms, our heritage is all that we value and want to keep for future generations, and that contributes to forming our identities as people, communities and nations.

"Heritage is the combination of all those things that make us, as individuals, the people we are and, on a larger scale, make us the nation we are," Geraldine O'Brien writes. "It can be as small as a baby's rattle, passed down through generations, a family photograph, books, or a piece of furniture. Or it can be as large as Uluru, the Sydney Opera House or an old harbour ferry."

(www.teachingheritage.nsw.edu.au/1views/identity.html)

A non-Aboriginal heritage item is defined as a building, work, relic, place or tree which is considered to have heritage significance. This can include such things as a house, factory, railway line, machinery, recreation reserve, cemetery or trees. Because of its size, diversity and proximity to the nation's earliest settlement history, there are many non-Aboriginal heritage items in the northern Sydney region.

Threats to Conserving Our Heritage

The major threat to retaining heritage sites, buildings and locations is the on-going pressure of urban consolidation and redevelopment, coupled with neglect.

Continuing development puts the following pressures on built heritage, including:

- increasing land values resulting in a push to maximise development potential of sites;
- development reflecting current trends, rather than existing character;
- increasing car ownership resulting in garages and carports replacing garden settings.

Heritage Sites in the NSROC Region

Significant heritage areas and items include large parts of Hunters Hill that have been identified as a conservation area. The following is a summary of heritage areas and sites within each LGA.

Hornsby Shire Council: contains 829 heritage items and five heritage conservation areas. It also has 10 items listed on the State Heritage Register and 23 items listed on the Register of the National Estate. Old Man's Valley Cemetery has been added to the State Heritage Register.

Hunter's Hill Council: Hunters Hill is recognised as a conservation area by the National Trust of Australia (NSW), the Heritage Council of Australia and a large proportion of the Municipality is heritage listed as a conservation area under the Hunters Hill Local Environmental Plan (LEP). It has been on the register of the National Estate since 1978. Hunters Hill has 522 heritage items listed on Schedule 6, and 588 contributory buildings listed under Schedule 7 of the LEP.

Ku-ring-gai Council: comprises a rare blend of fine domestic architecture within a landscape of indigenous forests and exotic plantings and gardens. Ku-ring-gai has houses designed by many of Australia's prominent 20th century architects which have influenced the mainstream of Australian domestic architecture nationally, including John Sulman, Howard Joseland, Hardy Wilson and Harry Seidler. The LGA contains 28 areas classified by the National Trust as Urban Conservation Areas. Of those, 16 have been reviewed in detail by the council as potential Conservation areas. There are more than 700 individual items listed in Schedule 7 of the Planning Scheme Ordinance. Of these, more than 600 are graded locally significant, and about 100 are graded as being of State significant. Twenty One items are included on the State Heritage Register, managed by the NSW Heritage Council.

Lane Cove Council: contains one conservation area and about 400 items of built, archaeological and landscaping heritage. A review by consultants, based on proposals by the Lane Cove Historical Society, the community and staff, has identified about 20 potential new items, including modern residential architecture, sea walls, boatsheds and other items of maritime history, public lookouts and plaques, and would diversify the register's range. There are five items on the State Heritage Register.

North Sydney Council: contains 25 heritage conservation areas containing 1466 items, and about 3000 within the LGA. Protection is provided by the North Sydney Local Environmental Plan, 2001. Of particular note are Luna Park, Brett Whitley's former home and studio, the BHP Tank Farm, the former quarantine boat depot, the National Maritime Museum shipyard and Graythwaite estate.

City of Ryde Council: contains four heritage conservation areas, with 174 items protected by the Ryde Planning Scheme ordinance. These include Aboriginal sites, schools, churches, clock towers, fountains, factories, shops and houses. There are 11 places within Ryde listed on the State Heritage register. Heritage groups in the area include Ryde District Historical Society and Brush Farm House Historical Society.

Willoughby City Council: contains 230 listed items, including 10 items on the State Heritage Register and 220 items of local environmental heritage. The Willoughby Local Government Area has 12 conservation areas with about 4100 properties. The Willoughby Heritage Advisory Committee continued to meet throughout 2007-08 to discuss policy and information issues. The Committee is comprised of councillors, council staff and representatives from other local community organisations.

Working to Preserve Our Heritage

Councils in the NSROC region continue working with the community to protect, manage, maintain and review local heritage sites. This is enhanced by the building of heritage information databases and the development and implementation of LEPs and heritage conservation plans.

The northern Sydney Councils also work together to share data and resources to maximise protection of these heritage sites.

Willoughby City Council received a grant of \$50,000 from the Heritage Branch of the Department of Planning to help with the conservation and adaptive re-use works of the Walter Burley Griffin-designed incinerator at Willoughby. The theme for the 2008 National Trust Heritage Festival was *Our Place*. Twelve community- and council-sponsored activities and events were staged in the Willoughby City LGA during this festival.

The major council event was the Willoughby City Heritage Awards. The aim of these awards was to recognise and promote sustainable design solutions that ensure that the significant heritage character of Willoughby City is maintained and enhanced as well as encouraging excellence in design, and to promote community awareness of our heritage.

On Thursday, November 1, 2007, the Minister for Lands, Rural Affairs and Regional Development Tony Kelly MLC transferred the care, control and management of The Priory and its surrounds to **Hunters Hill Council** to be incorporated into the Riverglade Reserve management plan. The main house and its various surviving outbuildings and garden structures including stone kitchen, stone walls, 1830s parterre, and 1940s air-raid shelter, as well as stone foundations of cellar, stables, and latrine siting, will now be protected.

The Priory and its surroundings are of national significance. The building is a rare example of 1830-1840s productive farmland of early colonial Sydney owned and developed by city auctioneer and musician Thomas Stubbs. The Priory was also the very first headquarters of the French religious order The Society of Mary (Marist Fathers) in Australia. The farm, building and gardens provided rest and recuperation for their South-Pacific missionaries.

The building itself is an exceptional example of the Georgian style (1857) designed by Colonial Architect William Weaver. Following on from this, in c1880, a neo-style addition was added, built for lawyer Thomas Salter, the third section of the Priory's unique architectural complex. The Priory is an item of institutional, medical and social historic importance following its 1888 inclusion – lasting for more than 100 years – into Gladesville Hospital, the earliest psychiatric hospital on the Australian mainland. The gardens, vineyards and farmland supported its various owners and occupants from the 1830s until the end of the hospital's occupation.

North Sydney Council believes that cultural resources are elements that underpin a community's cultural life, identity and sense of place. The cultural resources of its LGA include such things as historic buildings and

North Sydney Sustainability Centre – a community project at the coal loader

North Sydney Council is working with the community in developing the Sustainability Centre on a historically significant site at Balls Head Road, Waverton. In 1997, the then NSW Premier Bob Carr announced the Vision for Sydney Harbour Foreshores which involves three former industrial sites, including the former coal loader site, located on the Waverton peninsula.

The aims of this vision are to establish a number of land uses and precincts focusing primarily on recreation and maritime use, providing optimum public access and links throughout the sites. Drivers include protecting and integrating the site's significant cultural and natural heritage values, and integrating those into the planning, design and management processes.

The Sustainability Centre occupies the former caretakers/administration cottage on the eastern side of the Waverton Peninsula. The building will showcase a range of sustainability features such as energy and water efficiency, waste minimisation and use of recycled building materials and will be used as a base for community learning. It is part of the adaptive re-use of more than five hectares of regionally significant industrial land on the Sydney Harbour foreshore.

The centre will function as a sustainability resource space, and operate a variety of programs including public tours of the building, sustainable living

workshops and sustainable arts exhibitions. The key features of the site – including the proximity to natural bushland and Sydney Harbour, as well as existing Aboriginal and industrial heritage – will form the focus for learning.



landmarks, streetscapes, community events, pedestrian networks, parks and views. These elements form tangible links to the area's past and experience of cultural life needing to be conserved. To protect North Sydney's cultural life, North Sydney Council has identified specific cultural resources and included them in its planning controls through the heritage conservation plan. This process has involved extensive community consultation, identification of locally significant cultural themes, preparation of heritage and cultural studies, and a review of planning controls.

URBAN PLANNING/TRANSPORT

Widespread publicity has occurred over the growing concerns that Sydney's greater metropolitan region faces traffic gridlock in the foreseeable future, initially during peak hours. These stem from extrapolating the association between the rapid growth in private vehicle journeys, the expansion of toll and motorways, and the substantial residential growth within and outside the region. At the same time, there is evidence of an increasing strain on, and decreasing public confidence in, Sydney's existing passenger rail system. Added to this is the increased use of the existing road system for freight, with estimates predicting that the number of heavy vehicle movements across Australia will double by 2015. (*Noonan 2005*)

Traffic is an environmental, social and economic problem. Environmentally it causes deterioration in local and regional air quality, contributes to global warming and indirectly affects water quality through urban runoff. Socially it creates problems of noise, public health, reduction of local amenity and community safety. Economically it constrains commerce. Through restricted mobility, it delays products and services reaching markets and creates on-costs for consumers. Therefore, reducing traffic congestion remains a major challenge for all levels of government and the community in the northern Sydney region.



**Hunter's Hill Council
Walk2School program**

Initiated by members of the **Hunters Hill Council** Sustainability and Biodiversity Advisory Committee (SaBAC) the Walk2School program aims to encourage local public school children in years K-6 to walk to and from school for health, community and environmental benefits. The program builds partnerships between the council and local schools to reduce the number of cars on the road, ease peak-time traffic congestion around schools and improve the health of school children.

Throughout an identified school term, weekly distances were recorded for a period of four weeks. Distance targets were developed by the council, agreeing that if the targets were reached, the council would donate hardwood trees to the school as a reward for children's efforts. Distances were recorded by the school environmental group and provided to the council to calculate the total amount of carbon dioxide equivalent (CO₂e) saved through walking to school.

The council developed a W2S Quantification Tool based on the ICLEI-ANZ walking school bus quantification tool that calculated the total amount of CO₂e saved by the school over that four-week period.

The amount of CO₂e saved was accumulated over several terms as credit points against which the council then provided a tree if sufficient credits were reached. The amount of credit required for each tree was calculated using a tree carbon calculator provided by the CRC for Greenhouse accounting. The more CO₂e a school could save, the more trees they could earn.

The council has successfully worked with Boronia Park Public School and Hunters Hill Public School on the Walk 2 School program. In 2007-08 as a result of the program three trees have been planted and more than one tonne of CO₂e pollution prevented from entering the atmosphere.

Boronia Park Public School

Term 1, 2007 (four weeks) =270.66 kg of CO₂e
 Term 4, 2007 (four weeks) = 96.59 kg of CO₂e
 TOTAL GHG-e saved = 367.25 kg of CO₂e

Hunters Hill Public School

Term 3, 2007 (four weeks) =302.05 kg of CO₂e
 Term 4, 2007 (four weeks) = 412.97 kg of CO₂e
 TOTAL GHG-e saved = 715.02 kg of CO₂e

**Total emissions saved by both schools =
1082.27 kg of CO₂e**

In November 2006, the state government released its urban transport statement (UTS) which proposed new infrastructure, strengthening of 18 transport corridors and a new centre for transport planning and product development. Although the UTS includes a significant, welcome upgrade of Victoria Road, this has not been comprehensively identified in the Inner North Sub-regional Strategy released by the Department of Planning in July 2007. Instead, the Inner North Strategy reiterates the completion of the Lane Cove Tunnel and the Epping to Chatswood Railway Link which is near completion.

So traffic does not become an overwhelming environmental issue it is hoped the state government will commit to planning adequate infrastructure to service the growth councils are expected to provide over the next 25 years.

A major component of the metropolitan strategy was to have been the completion of the north-west rail line to connect the new growth areas in the north west with the rest of the city. This intention is also reflected in the State Infrastructure Strategy (SIS) released in May 2006. Current debate on the viability of significant components of the SIS (such as the north-west rail line or the more recently proposed north-west metro line) and the changes made by the government to previous guaranteed projects (such as the truncation of the Epping-to-Chatswood rail line) further underline concern that regions are being forced to accept high levels of urban consolidation without adequate transport infrastructure.

NSROC has already identified major regional transport infrastructure requirements (*NSROC Sub-Regional Planning Strategy 2006-31*) it sees as necessary to enable further residential consolidation on the scale envisaged in the Metropolitan Strategy without overwhelming environmental and economic effects. These are:

1. completion of the Parramatta -Chatswood rail line
2. completion of the M2-F3 orbital link road
3. A Hornsby-to-Newcastle high-speed rail line
4. A bus-only transit way between Chatswood and the Brookvale/Dee Why centre
5. Integrated public transport to Macquarie Park
6. A second Harbour Bridge rail crossing
7. A pilot project to introduce demand-responsive transport, public transport services that complement and meet service gap areas under the new principal bus contractors arrangements
8. The creation of a transport strategy for the Victoria Road corridor, addressing private vehicle and public transport
9. Improvements to major intersections on State arterial roads (for example, a flyover at the intersection of Boundary Street and Pacific Highway, and a flyover at the Archibald and Penshurst Streets intersection);
10. Retention of existing ferry services and the investigation of possible extensions to these services
11. The creation of a Pacific Highway corridor strategy to relieve growing pressure on this major north-south artery
12. A strong focus on, and commitment to, active transport (bicycle and pedestrian) programs and infrastructure such as the proposed HarbourLink cycle pedestrian way to connect the existing off-road network on the Lower North Shore with the Harbour Bridge. This would enable safe mass commuting by bike.

CASE STUDY

Case study *Commuting to Chatswood* bicycle map

Willoughby Council has developed a *Commuting to Chatswood* map detailing both on-road and off-road bicycle routes on the North Shore. The map covers a wide regional area surrounding the Willoughby LGA including the North Sydney, Lane Cove, Kuring-gai, Ryde, Mosman, Warringah and Hunters Hill municipalities. The map was initially developed in 2006-07 in consultation with Willoughby Council's bicycle consultative committee, Bike North, the North Shore Bicycle Group and neighbouring councils. The map was so popular that 5000 copies were distributed in the first year, requiring a reprint in 2007-08. This allowed for the map to be updated, including major new bicycle routes that had been recently completed in accordance with the Willoughby bike plan.

The *Commuting to Chatswood* map compliments the *Walking and Wheeling in Willoughby* map and the *Willoughby Walking Map*. This walking map has been developed in consultation with the Willoughby

Walking Volunteers and consolidates all walks in the LGA on a single map. Willoughby Council is committed to promoting active transport to residents and visitors, as walking and cycling reduces vehicle congestion and emissions, provides opportunities for exercise and improves the local area's amenity.

These maps play an important role in providing residents and visitors with information on how and where to get active in the local area.



The state government’s present approach is to connect NSROC urban centres with the transport network. However, the network is already under significant capacity constraints. These are being addressed in part through the railway clearways program and the bus reforms. However, local and regional data consistently show increases in private vehicle use, longer journey times, and major infrastructure capacity failures. The NSROC region looks to the metropolitan strategy to identify commitments for public transport infrastructure over the next 30 years.

Although northern Sydney has substantial infrastructure for road, rail and some other transport services, this will not be able to serve the region’s increased demands because of to urban consolidation, sustained competitive economic growth and cross-regional transport (particular western and Central Coast through traffic) without a long-term plan for maintenance and upgrades. New transport infrastructure proposals should proceed on the basis of a close, consultative partnership with local government and communities.

The Impact of Traffic

Discussions with each NSROC council showed they rank the current level of traffic congestion high on their list of environmental concerns, and that the problem is progressively worsening across the region. Considerable attention has been given to the severe effects likely to be created by the traffic congestion in the south and west of Sydney. But it appears a point will be reached when these effects will be shared equally across Sydney.

The NSROC region is serviced by five major arterial roads. These are the F3 freeway from the north, the Pacific Highway, Pennant Hills Road, Lane Cove/Ryde Road, and Epping Road/M2 tollway. Anecdotally, peak hours on most of these roads on weekdays already extends from 6.30am to 9.00am, and from 3.30pm to 7.00pm. One characteristic of each road is that this is not unique to the NSROC region. All are corridors linking Newcastle, the Central Coast or the Northern Beaches to the city and further south (Pennant Hills Road and Pacific Highway), or the city and eastern suburbs to the western suburbs and the Blue Mountains (Victoria Road and Epping Road), or the south-west region to the north and north east (Lane Cove Road/Ryde Road).

It is likely that completion of the M7 tollway will exacerbate congestion on Pennant Hills Road and Epping Rd/M2. It also remains to be seen how the new Epping Road Tunnel and the Epping-to-Chatswood rail link will affect local and regional traffic. Both of these projects are occurring within the context of substantial residential and commercial growth associated with the development of Macquarie Park and the region’s major urban centres. In the longer term, the population of the Central Coast and Hunter Region are also likely continue growing in parallel with that of the Sydney basin – be this strategically directed or as a product of market forces.

As the northern Sydney region is a corridor for traffic accessing these regions, it is anticipated this growth will create additional pressure on existing infrastructure. Overall, evidence points to an inescapable move towards severe traffic congestion throughout the northern Sydney region in the medium future, and most likely gridlock in morning and evening peak hours. (Noonan 2005)

Regional Transport Data

The most relevant data available for the region was collected in an RTA traffic survey undertaken as part of a three-year repeating cycle covering all of NSW. This recorded the annual average daily traffic (AADT), which is assessed as the total volume of traffic recorded at a specific road location taken over a calendar year, divided by the number of days in that year.

The data showed that, of the 19 arterial roads that exceeded this flow throughout all of Sydney’s greater metropolitan region, eight were in the NSROC region and another three were contiguous with it (that is, as feeder or off-take roads). In other words, half the most congested traffic thoroughfares in Sydney are either in this region or skirt it. The maximum traffic counts recorded on the key roads of interest were:



Figure 9: Traffic Count on Key Roads 2005 (Noonan 2005)

Epping Rd	76,000
F3 freeway at Wahroonga	79,000 (feeder road)
James Ruse Drive	73,000 (feeder road)
Lane Cove / Ryde Rd	77,000
Military Rd	77,000
Pennant Hills Rd	79,000
Victoria Rd	89,000

Certain roads on the southern side of Sydney Harbour Bridge also showed inordinate congestion. General Holmes Drive carried 134,000 vehicles, Southern Cross Drive 119,000, Parramatta Road 89,000, and Princes Highway 87,000. The M5 East was not functional when this AADT data was collected, but now probably matches the worst of these. (Noonan 2005)

Figure 10: Mode of travel to work, in the NSROC region and the Sydney Statistical division, 2006

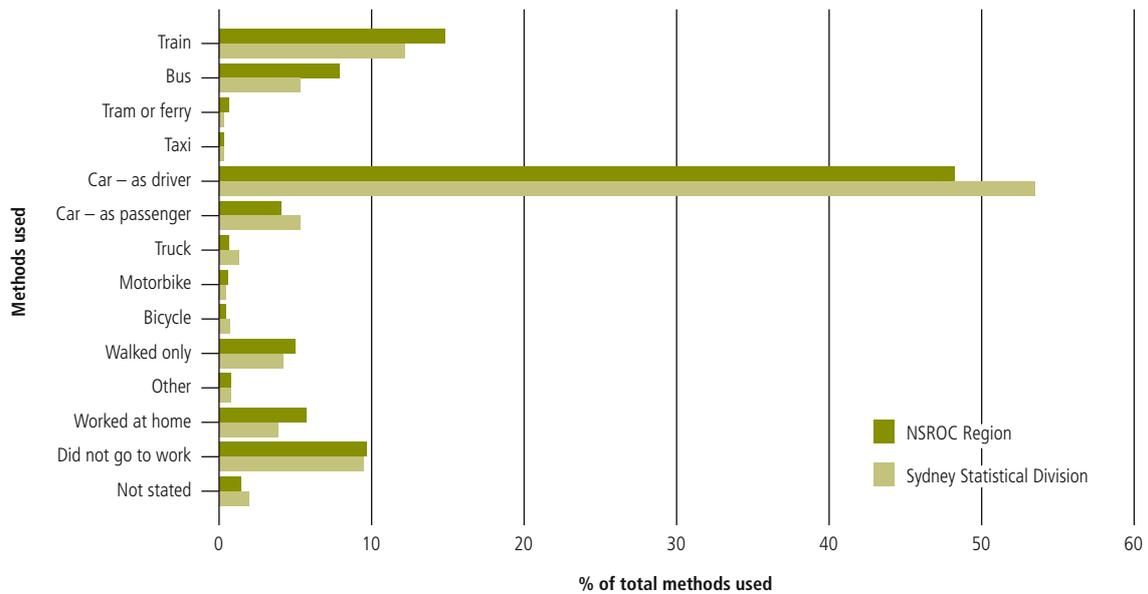


Figure 11: Change in mode of travel to work in the NSROC region, 2001 to 2006

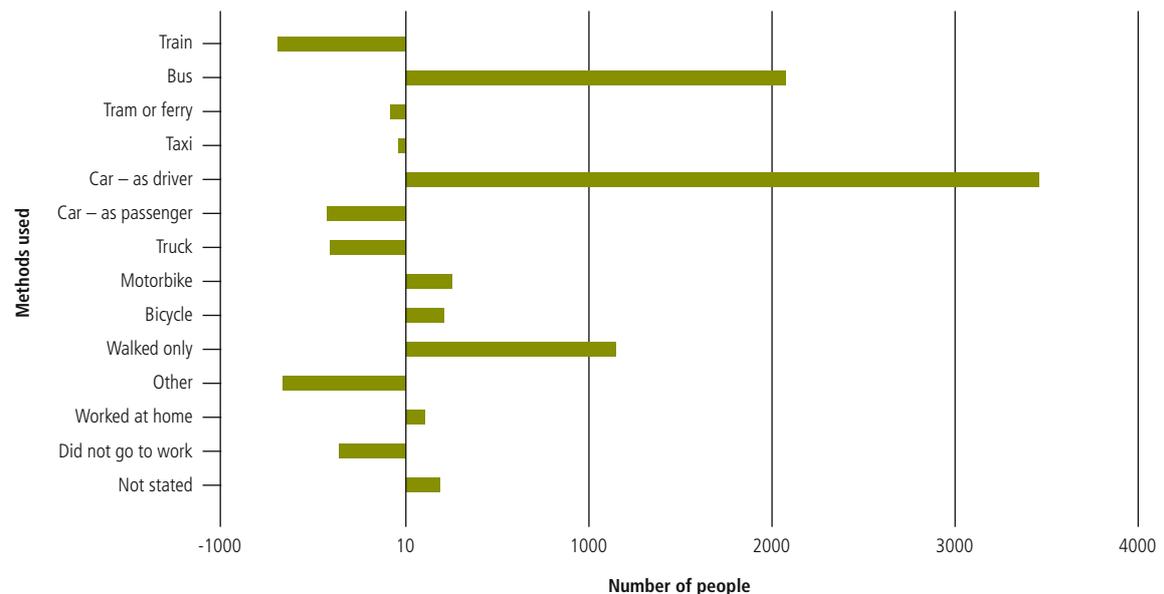
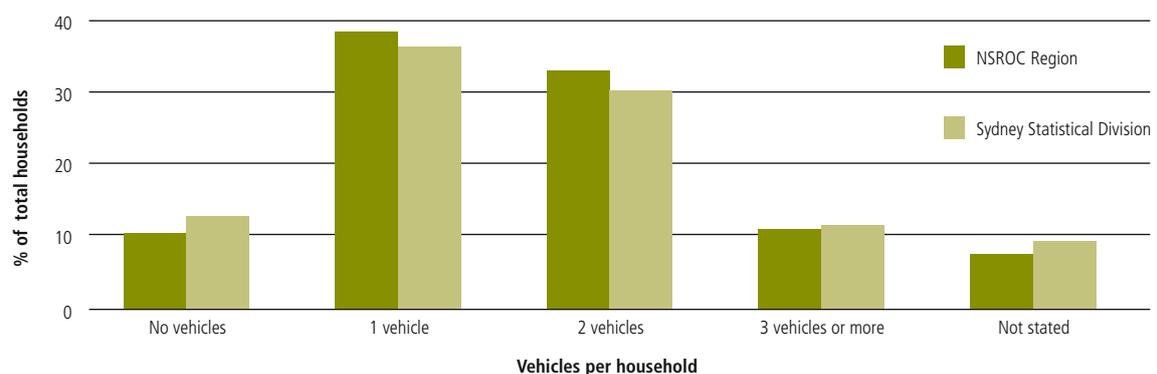


Figure 11: Demonstrates a worrying trend within the region to a greater reliance on private vehicle use (and to a lesser extent on buses) over other modes of transport, particularly trains. The lack of reliability and carrying capacity of the train system is emerging as a critical issue for the region, particularly as most of the growth planned for in the state government's strategic planning documents posit growth and consolidation around transport nodes such as railway stations.

Figure 12: Daily traffic volumes at key locations in the NSROC region 2006

Road	Location	Average Daily Traffic
EPPING RD, MR373	LANE COVE, WEST OF ELIZABETH PDE	33,471
EPPING RD, MR373	LANE COVE, WEST OF ELIZABETH PDE	37,546
EPPING RD, MR373	LANE COVE, WEST OF LONGUEVILLE RD	33,375
EPPING RD,MR373	LANE COVE, WEST OF LONGUEVILLE RD	38,538
GORE HILL FWY, MR651-SL15	WILLOUGHBY, NORTH OF NORTHCOTE ST	38,100
GORE HILL FWY, MR651-SL15	WILLOUGHBY, NORTH OF NORTHCOTE ST	39,918
BURNS BAY RD, MR166	HUNTERS HILL AT FIGTREE BRIDGE	19,403
BURNS BAY RD, MR166	HUNTERS HILL AT FIGTREE BRIDGE	22,287
PACIFIC HWY, SH10	CHATSWOOD, SOUTH OF MR328,BOUNDARY ST	30,038
PACIFIC HWY, SH10	CHATSWOOD, SOUTH OF MR328,BOUNDARY ST	28,427
PACIFIC HWY, SH10	PYMBLE, SOUTH OF TELEGRAPH RD	29,642
PACIFIC HWY, SH10	PYMBLE, SOUTH OF TELEGRAPH RD	34,304
PACIFIC HWY, SH10	WAHROONGA, EAST OF SYDNEY-NEWCASTLE FWY	30,559
PACIFIC HWY, SH10	WAHROONGA, EAST OF SYDNEY-NEWCASTLE FWY	28,372
PACIFIC HWY, SH10	WAHROONGA, NORTH OF SH13,PENNANT HILLS RD	17,166
PACIFIC HWY, SH10	WAHROONGA, NORTH OF SH13,PENNANT HILLS RD	14,921
PACIFIC HWY, SH10	ASQUITH, SOUTH OF MILLS AV	7,643
PACIFIC HWY, SH10	ASQUITH, SOUTH OF MILLS AV	9,654
PACIFIC HWY, SH10	BEROWRA, 2K NORTH OF BEROWRA WATERS RD	1,213
PACIFIC HWY, SH10	BEROWRA, 2K NORTH OF BEROWRA WATERS RD	1,347
VICTORIA RD, MR165	RYDE, EAST OF BELMORE ST	29,580
VICTORIA RD, MR165	RYDE, EAST OF BELMORE ST	26,641
CHURCH ST, MR200-SL2	RYDE, AT RYDE BRIDGE	39,923
CHURCH ST, MR200-SL2	RYDE, AT RYDE BRIDGE	43,863
EPPING RD, MR373	EAST RYDE, WEST OF HILLS MWY,M2 TERMINAL	27,424
EPPING RD, MR373	EPPING, AT TERRY'S CREEK BRIDGE	19,720
EPPING RD, MR373	EPPING, AT TERRY'S CREEK BRIDGE	19,783
PENNANT HILLS RD, SH13SL1	PENNANT HILLS AT RAILWAY BRIDGE	38,167
PENNANT HILLS RD, SH13SL1	PENNANT HILLS AT RAILWAY BRIDGE	37,110
PENNANT HLS RD, SH13-SL9	WEST PENNANT HILLS, SOUTH OF COPELAND RD	36,842
PENNANT HLS RD, SH13-SL9	WEST PENNANT HILLS, SOUTH OF COPELAND RD	36,951

Figure 13: Car ownership in the NSROC region, 2006 Census Data



NSROC councils are monitoring car ownership per capita throughout the region. Of specific concern is the relatively high level of car ownership despite good access to public transport in many parts of the region and the increase in the number of households electing to have two or more cars. This may be due to both the fall in overall vehicle purchase costs and a falling reliance on public transport because of its unreliability, capacity constraints, lack of integration, lack of single-ticketing options, and an overwhelming focus on journeys into the CBD rather than radial trips around the city.

Meeting the Challenge of Sustainable Transport

Increased private vehicle use coupled with a growing population is a major challenge facing the northern Sydney councils. Councils play an important role in educating the community on sustainable transport choices, and in encouraging active transport options such as cycling and walking. Although major decisions regarding the provision of public transport infrastructure remain the domain of the state government, the NSROC councils work closely with transport agencies to ensure opportunities for active transport and public transport are maximised.

At present, a number of railway stations and bus interchanges in the region are being upgraded and a new Metro train line is proposed to run through to the North West of Sydney. However this key transport link, which forms the platform for public service transport provision to the new release areas in the North West has been the subject of some conjecture in the media regarding whether it will ever be built and is currently the subject of an inquiry by an Upper House Committee of the State Parliament.

The State Government bus reforms are also underway. However, councils have not had a significant role in developing new bus contracts. NSROC has also identified a number of major infrastructure requirements and has started lobbying the government to have them considered. These include completion of the M2-F3 orbital link, a strategy for the North Sydney-to-Macquarie Park corridor, and consideration of light rail options and an integrated cycle network.

The NSROC councils have also enacted a number of local projects to further encourage use of public transport and alternative methods of transport. The use of public transport by **Lane Cove Council** and **City of Ryde** staff is encouraged by the new *Travel Smart* policy which allows staff to pay for annual public transport tickets through weekly salary sacrificing.

CASE STUDY

City of Ryde delivers the free 'Top Ryder' bus service

Working in partnership with the developer of the Top Ryde city shopping centre, the **City of Ryde** has provided a free community bus service. The new Top Ryder bus service runs from Gladesville to West Ryde via Top Ryde, and provides access for Ryde residents to shopping and medical services. Two 25-seat buses have been adapted for access by the elderly and those with impaired mobility.

There are 10 designated bus stops for the 23km route one way, and buses run in opposite direction to each other on Monday to Saturday, from 9.30am to 3.00pm daily. The buses are colour-coded orange and blue to indicate which direction they are travelling in and each bus completes a circuit in an hour. Each bus completes five circuits every day. Passengers can catch the service from the designated stops and any STA bus stops along the way.

This service is a practical example of Ryde City's integrated transport and land-use strategy in action. As well as providing a service for many thousands

of high-need users every year, it delivers significant environmental benefits by:

- discouraging car travel
- promoting sustainable transport
- reducing traffic congestion
- reducing greenhouse gas emissions
- improving local air quality



North Sydney Council is committed to encouraging an active lifestyle for residents and visitors, and has produced an updated *Cycling North Sydney* map and helped to develop regional walking maps including the *Harbour to Spit Walk*, the *Harbour Bridge to The Great North Walk* and *A Harbour Circle Walk*. The cycling map was developed to compliment the council's North Sydney bike plan. Regional walking maps – which are now up to version three – have been developed by the walking volunteers with the help of councils and the state Department of Planning. Extensive consultation was undertaken with the North Sydney Pedestrian Committee.

As part of planning for Turramurra town centre, **Ku-ring-gai Council** has been aiming to improve access to public transport in the town centre. The council recently negotiated a wider concourse for Turramurra railway station's easy access upgrade. The result is a better pedestrian connection across the railway line between the Ray St/William St and Rohini St/Eastern Rd areas. In future upgrades, a new pick-up and drop-off area is proposed in a widened Forbes Lane. An upgraded bus interchange and a potential new road bridge over the railway line between Ray St and Rohini St will cut delays and improve access for buses into and out of Turramurra town centre. Improved pedestrian and bus access to the centre give residents and commuters alternative ways of getting to and from the railway station, reducing demand for access by passenger vehicle.

In August 2007, the **City Of Ryde** adopted its integrated transport and land-use strategy (ITLUS), which will inform council policy and lead towards an improved transport future for the City Of Ryde. The ITLUS focuses on a city-wide report and six key centre-based reports. These centres are Macquarie Park, Eastwood, West Ryde, Meadowbank, Ryde town centre and Gladesville. The ITLUS informs current land use planning across Ryde, including the significant development of the DCP at Macquarie Park and other centre-revitalisation projects. The strategy aims to improve the interconnectivity between centres, achieving a more sustainable and integrated transport and land-use system. The strategy also aims to reduce car dependency and boost public transport patronage across Sydney.

Every year **Hunters Hill Council** provides financial help to community groups and non-profit organisations for projects designed to promote its residents' wellbeing. In early 2008, a \$500 grant was made to Ryde/Hunters Hill Community Transport. This recognised the important role community transport plays in providing mobility for shopping and medical access to seniors, and contributed to a new service for men over 65 or with a disability who live in the Ryde or Hunters Hill area. This service allows these people to experience local places of interest on a monthly basis.

In 2007-08, **Lane Cove Council** introduced its draft bicycle plan, prepared by Jamieson Foley and Associates, in conjunction with transport consultants and GTA consultants. The bike plan's main objectives are to make cycling safer, easier and more attractive in the Lane Cove LGA, and to allow for greater connectivity with surrounding bicycle paths. The plan will cater for all types of cyclists and trip types, including students, commuter and recreational cyclists, as well as others wanting to use cycling infrastructure, including walkers and joggers. Lane Cove Council is also participating in the regional Sydney bicycle plan.

Lane Cove Council has also approved a car-sharing scheme to be implemented in the Lane Cove town centre. The council has provided two parking spaces close to the town centre, and will support the extension and promotion of this environmentally and socially beneficial scheme through its publications and website, and through appropriate promotions and partnerships.

Willoughby Council has been working on a number of projects to promote active transport in the area and new bicycle routes have been implemented along High Street, Edinburgh Road, Laurel Street, Herbert Street, Hampden Road, Merrenburn Ave and Henry Lane. The existing bicycle map was updated to include these new paths and additional transport access guides were developed for a number of new locations. Cycling-skills workshops and bicycle maintenance seminars have been provided for. The council's own staff are encouraged to use the newly introduced staff bike fleet for short work trips.

Willoughby Council's CouncilCab program has continued to grow, and additional car-sharing pods have been introduced in Chatswood, St Leonards and Artarmon. A number of local walking links were improved as part of the Council's Walk This Way program in consultation with the council's walking volunteers. Willoughby Council has also been working with local primary schools to encourage sustainable travel to school.

Hornsby Council undertook a sustainable fleet management study in 2007 and is now implementing its recommendations. Some include encouraging staff to swap six-cylinder vehicles for four-cylinder vehicles with a sustainability incentive, seeking the co-operation of the RTA to check the emissions performance of its vehicles, investigating mechanisms by which staff are able to buy annual train tickets in a tax-advantageous way, and improving the economic and environmental performance of the fleet.

WASTE MANAGEMENT

Waste is being viewed increasingly as a resource rather than a liability. It has the potential to be recycled, re-used or used to generate energy. The way it is managed affects human health and contributes to waterway, air and groundwater pollution, the human-induced greenhouse effect and contaminated land.

Waste can have negative impacts on public health, the aesthetics of the environment, the aquatic environment and groundwater. It contributes to greenhouse gas emissions through methane escaping from landfill sites. Also, as there is only a finite amount of land that can be used for landfill, it is important to continue reducing waste.

CASE STUDY



Hunters Hill Waste to WOW!!! Recycled Art Competition

The Hunters Hill Council 'Waste to WOW!!!' recycled art competition aimed to boost teenager's awareness about how packaging and household materials can be reused and recycled into new resources, rather than discarded as waste.

The council invited high school students to become creative using materials that would normally end up in landfills. The main purpose of the competition was to stimulate young people's imaginations and promote education on sustainable living concepts, especially renewable resources. Entrants could invent a new object or construct a new version of their

favourite tool or every-day item. They could use anything and everything— provided the material came from a used or recycled item.

More than 60 entries were received from schools in the LGA, and these were displayed at the Boronia Park Eco Festival. The winners were judged by Hunters Hill Council's mayor and a representative from the competition sponsors, WSN Environmental Solutions. The sponsorship ensured a successful competition and some great prizes for kids – such as video cameras, MP3 players, surfing lessons, remote-controlled helicopters and scooters.

Waste Issues

The councils in the NSROC region face a number of pressures affecting the performance of waste management such as:

- community co-operation and participation in continuing to recycle materials without contaminating the respective waste streams
- higher costs in disposing of waste materials because of limited disposal options and transport costs
- community consumption patterns
- community expectations on service levels
- legislative and statutory powers which regulate the management of waste
- availability of new alternative technologies to manage waste
- falling number of land fill sites.

Solid Waste Disposal and Recycling

In 2007-08 residents of the NSROC region generated 104,364 tonnes of material which went to landfill. Another 137,879 tonnes of material was recovered through recycling systems and an additional average of 100 kilos of green waste was recycled for each person in the region. In 2007-08 the amount of material diverted from landfill through recycling and green waste collections was 256 kilos a person.

In total, more waste was collected in 2007-08 than in previous years, reflecting the region's growing population. However, the volume and percentage of waste being recycled has increased considerably, and the total landfill has fallen 14,030 tonnes since 2005-06. Total of resources recycled has risen 46,787 tonnes since 2005-06. .

Figure 14: The division of landfill and recycled waste by council within the NSROC region, 2007/08

Council	Total resources to landfill (tonnes)	Total resources recycled including green waste (tonnes)	Total resources to landfill per capita (kgs)	Total resources recycled per capita (kgs)	Green waste diverted from landfill per person per annum (kgs)
North Sydney	7,481	14,154	118	223	20
Lane Cove	6,116	5,472	191	171	53
Hunters Hill	1,708	2,523	122	180	40
Ryde	24,797	21,766	241	212	97
Ku-ring-gai	21,568	33,701	193	316	164
Hornsby Shire	33,209	38,172	209	126	111
Willoughby	9,485	22,091	138	323	90
NSROC	104,364	137,879	198	256	100

Total Greenhouse Gas Emissions saved in NSROC region resulting from recycling (using DECC environmental calculator): 69,234 tonnes of CO₂

Responding to waste issues

NSROC councils are increasing their recycling facilities, reviewing their processes and looking at new technologies to maximise effectiveness of waste-management services. They're also working closely with the community to increase awareness among residents of the importance of responsible disposal of waste, and the negative impacts waste has on the environment and public health. A combination of education programs, workshops and events are held in schools and the wider community to encourage minimum waste consumption and maximum recycling.

Hunters Hill Council introduced an optional green waste bin for garden vegetation collections in July 2006. Because of the service's growing popularity and success in 2006-07, the council expanded the green service in 2007-08 by providing residents with additional green waste bins if they wanted them. A charge was introduced for additional services, although a single service is free. As a result, Hunters Hill has increased the diversion of green waste from landfill 55 per cent.

Hornsby Council has been encouraging residents to reduce their waste to landfill by introducing two electronic waste and chemical collections a year, publicising the recycling education program, funding the Keep Australia Beautiful's Waste Watchers' Program in schools, introducing a light bulb recycling program, running wood-chipping

days, undertaking a waste and recycling audit, and running workshops on composting, green cleaning, as well as conducting recycling tours.

Ku-ring-gai Council, supported by Veolia Environmental Services and WSN Environmental Solutions has launched a campaign to tackle the problem of illegal waste dumping in its LGA. The campaign consists of increased advertising and education about the effects of illegal dumping, improved surveillance at major dumping 'hot spots' and improved reporting mechanisms that allow the community to play a greater role in helping the council catch offenders.

The 2007-08 financial year is the first whole year that **Willoughby City Council** has sent 50 per cent of its domestic waste to the UR-3R alternative waste treatment facility at Eastern Creek. This has resulted in an increase in material diverted from landfill; Willoughby's diversion rate is now 74 per cent, well above the state government's target of 66 per cent by 2014. Lane Cove Council organised several free community workshops for worm farming and composting in 2007-08 to encourage residents to reduce the amount of food waste going into landfill, and to provide tips on how to cultivate organic gardens.

Lane Cove Council and **Willoughby City Council** co-hosted their annual Recycle Your Electronic Waste event on February 23, 2008. The event was popular with residents who delivered approximately 750 cars loads of monitors, televisions, stereo systems, laptops and notebooks, keyboards, computer cables, modems, printers, scanners, videos and DVD players, and various other electronic . Some 2210 items were recycled, with a total of 34.5 tonnes processed.

The e-waste collected from this event is to be processed by PGM Refiners in Australia, using the latest alternative recycling and recovery technologies. PGM Refiners not only treats the hazardous material but also recovers recyclable materials. Rather than incinerating, the materials are dismantled and segregated where they are then subjected to environmentally friendly processing within Australia. This produces high commodity concentrate for reuse.

In May 2007, **Willoughby City Council, North Sydney Council, Lane Cove Council, City of Ryde and Mosman Council** launched a multi-unit dwelling (MUD) illegal dumping prevention campaign developed by the Department of Environment and Conservation and for which the councils were awarded a \$50,000 grant to develop on a regional basis. The campaign consisted of sending out the clear, strong message that dumping is dumb, illegal and will not be tolerated. Public buses, railway stations and local newspapers carried the campaign message *Dumping. It's dumb*. A 24-hour telephone hotline was set up to allow residents to report illegal dumping or to secure more information about council clean-up services. The regional advertising campaign was supported by each individual council undertaking local educational and enforcement programs.

North Sydney Council has implemented more than 30 waste-avoidance and minimisation programs, including an annual e-waste collection program and illegal dumping education and enforcement program for multi-unit dwellings. The council also started an alternative waste-disposal contract which means 70 per cent of residents' waste stream is diverted from landfill, and recycled or reused. A residential waste stream composition audit was also conducted to evaluate future recycling opportunities. The council achieved the state government's target for 44 per cent of waste to be diverted from landfill by 2008 in 2004. Currently, more than 80 per cent of North Sydney's waste is diverted from landfill. An interesting project has been the development of a commercial organic waste trial now under way in the North Sydney CBD.

City of Ryde has continued to reduce the amount of domestic waste going to landfill this year by another 3 per cent. This has been achieved through many ongoing waste education programs which include free on-site chipping and mulching, SecondHand Saturday events, free e-waste collections, recycling of mobile phones, composting and worm-farming workshops. Waste education for 2007-08 has focused on schools, with many schools becoming involved in waste-related activities including Follow Your Waste tours to WSN's Chullora facility, the rubbish-free lunch challenge and the Ryde Environmental Education Network (REEN) established for



teachers. The council also supplies worm farms and/or compost bins to City of Ryde schools taking part in its waste reduction campaign, and free or at heavily reduced rates for residents. The City of Ryde encourages residents to increase recycling by supplying additional recycling and greenwaste bins for \$35 a year in comparison to waste bins which are \$226 a year. As well as this, the council is using DECC's Dumping. It's dumb! program and has funded its own illegal dumping campaign, including bus advertisements.

NOISE

Poor noise management represents one of the potentially great nuisances of intense urban living. Offensive noise can be generated by sources that vary with circumstances applying in an LGA, but there is a certain level of subjectivity attached to defining when a specific noise becomes offensive. Variables such as volume, pitch and duration lead to differing interpretations of when noise is intrusive or offensive. Day and night are associated with different levels of concern because of the variability in their background noise levels. (Noonan 2005)

Noise issues

Environmental noise is an increasingly apparent issue within the community. Noise from urban developments, transport/traffic, industrial construction, neighbourhood and recreational noise is increasingly affecting the community and its quality of life. Increases in high and medium developments, closer interface between commercial and residential areas, and increasing levels of dog ownership in urban areas continue to contribute to complaints about environmental noise.

Noise complaints

Throughout the NSROC region, six causes of annoyance stand out, – barking dogs, air conditioners, swimming pool pumps, early-morning garbage trucks, and (less frequently) improperly set building alarms and the use of power tools. This is based on the most common complaints reported to each of the councils, but is not inconsistent with the patterns reported to the Department of Environment and Climate Change (DECC) for all of Sydney.

The NSROC area is also affected by aircraft noise, and there is evidence in recent months that fly-overs for some North Shore suburbs are up to twice the number agreed by Air Services Australia as appropriate. (Noonan 2005)

If this pattern continues, aircraft noise could become a more prominent environment issue in future. It should be noted that in the aircraft noise data provided below the number of complainants was significantly lower than the number of complaints.

Complaints-reporting is one sub-set of the noise concerns. Road traffic and rail can also be major causes, especially when heavy vehicles apply their engine brakes or motorcycles with lower-quality mufflers accelerate. Concerns such as these are more likely to be detected in environmental surveys rather than in complaints registers, because they are more diffused and harder to tag to specific offenders. But more recent additions to the traffic-borne offenders, including offensive motor vehicle alarms and sound systems, have provoked regulatory action.

Figure 15: Number of complaints due to noise within the NSROC region 2007/08

Council	Barking dogs	A/C	Building sites/ construction	Licensed premises	Garbage trucks	House & car alarms	Domestic noise source	Aircraft noise	Other	Total
North Sydney	45	40	238	0	8	27	95	9	102	564
Lane Cove	39	11	18	0	4	5	10	118	6	211
Hunters Hill	17	3	2	0	2	1	0	510	0	535
Ryde	160	18	10	2	4	12	34	54	16	310
Ku-ring-gai	285	48	78	0	17	2	33	0	34	497
Hornsby Shire	326	17	31	8	8	7	112	20	28	557
Willoughby	132	n/a	74	11	n/a	n/a	n/a	n/a	11	211
NSROC	1,004	137	451	21	43	54	284	711	197	2,885



Responding to noise complaints

The northern Sydney councils play a major role in addressing noise complaints through the actions of environmental health officers and rangers who can take action under various government acts and council regulations. This role is shared with the DECC, the police, the NSW Maritime Authority and the RTA. Although the most common source of domestic noise complaints continues to be barking dogs, a recent runway safety project initiated by Sydney Airport Corporation and its longer term plans identified in its current draft master plan for a significant rise in plane and passenger movements mean aircraft noise is likely to become a much more prominent issue.

There are various ways to mitigate urban noise. Techniques such as the use of sensitive building designs and noise barriers can be particularly helpful, but certain features of the natural environment can also help. Topographical separation between the source and the recipient – such as a hill – can be very effective, as can suitable vegetation cover. Urban intensification can remove buffers provided by beneficial natural assets and introduce features that amplify sounds. Exactly how and where the greatest sources of noise will occur in future is unpredictable, especially if the estimation seeks to take into account all possible mitigation options. (*Noonan 2005*)

While the northern Sydney councils will continue to respond to noise complaints, they are paying increasing attention to sensible site planning, building layouts and the use of noise-reducing insulation when approving developments. Similarly, in long-term infrastructure planning, the nomination of transport corridors for traffic management can take account the effects on residents within the impact zone; and noise barriers can be installed at the most vulnerable locations.

In June 2007, the DECC released a regulatory impact statement detailing proposed changes to the current noise control regulation. The current regulation's main objective is to limit the amount of community noise in neighbourhoods. It applies to noise sources such as appliances, power tools, garden equipment, sound systems, musical instruments, motor vehicles and motor boats. The regulation is enforced by a number of agencies including councils, the Police, DECC and NSW Maritime.

The review of the noise control regulation will improve the alignment between legislation and prevailing community expectations on noise control. The proposed amendments are principally aimed at looking at noise from motor vehicles, domestic articles and boats through the application of noise-abatement technologies, and by effecting behavioural change. (*Regulatory Impact Statement, Proposed Protection of the Environment Operations (Noise Control) Regulation 2007, DECC, June 2007*)

ENERGY CONSUMPTION

Energy use is an integral part of human settlement. We consume energy in our houses, workplaces, streets, and any other areas in which humans have settled. This section looks at how energy consumption has affected the environment through human settlement, and how we humans are working towards mitigating adverse effects through energy consumption.

Energy use produces a significant amount of Australia's greenhouse gas emissions. Most of our energy is produced through burning non-renewable fossil fuels, such as coal, which creates significant amounts of greenhouse gases. Although renewable sources of electricity are being implemented through hydro, wind and solar technologies, these sources still only provide a fraction of all energy consumed today.

Energy Demand

Urban intensification can directly lead to increased energy use as the benefits of shade trees, cross-ventilation and building orientation are lost in favour of larger structures with greater cooling and heating requirements.

The process of urban consolidation in the northern Sydney region, in conjunction with greater energy demands in commercial and retail sectors and through changing lifestyles, have all intensified energy demand. The increasing popularity of home air conditioners seems likely to continue, and if recent trends persist, these will also become larger and more sophisticated. There is also a strong trend to ownership of more energy-hungry appliances such as televisions, phones, stereos and fridges.

While these changes in part can be off-set through more energy-efficient technologies and greater consciousness about energy wastage, the overall growth in population coupled with an increasing dependence on energy-intensive appliances is increasing energy demand throughout the region. (Noonan 2005)

CASE STUDY

100% GreenPower

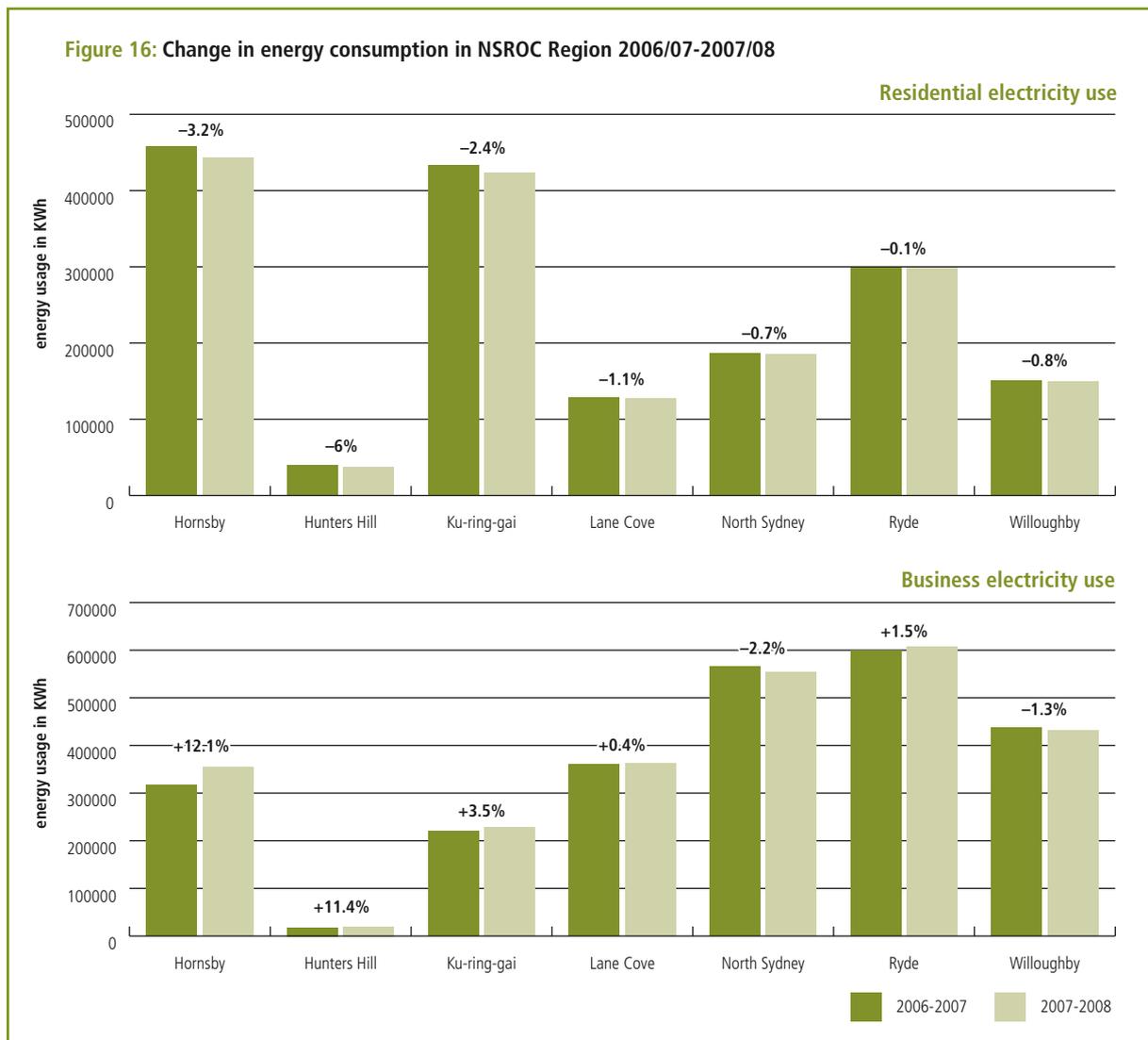
Willoughby City Council has made the switch to 100 per cent GreenPower for the energy needs of its administration building and Chatswood Mall. GreenPower is independently accredited, renewable electricity bought from sources such as wind turbines, solar and micro-hydro generation. GreenPower ensures investment in new clean technology.

This was the first major initiative to be rolled out as part of the third term of the e-restore program. The switch to GreenPower strengthens Willoughby's target of a 50 per cent reduction in greenhouse gas emissions by 2010.

To mark this important occasion, a spectacular event was held alongside the popular Melody Markets in Chatswood Mall. Roving wind turbines, stilt walkers, a sound and light show pre-empted the symbolic flick of an oversized switch by Willoughby Mayor Pat Reilly and a local primary school student, Katie Gardiner. Electricity currently represents 81 per cent of the council's emission profile. GreenPower at these key sites will save more than 1373 tonnes of greenhouse gas emissions a year, which equates to taking 319 cars off the road each year.

Right: Northbridge Primary School student, Katie Gardiner and Willoughby Mayor, Pat Reilly flick the switch to GreenPower





The Extent of Energy Use

Energy consumption patterns by sources in all Australian capital cities have shown a marked rise in the past 10 years – even over the past five years. This appears to exceed both population growth in that period and the increase in commercial activity that has been associated with a buoyant economy. For Sydney, which receives little natural gas supplies, this has been consumed largely as electricity, most of which comes from coal-fired power stations.

A dissection of current non-industrial energy consumption patterns, which is most relevant to the NSROC's strategic planning because of its low industrial base, shows there has also been a rising trend in energy consumed per person. This implies the emergence of changed behaviours underpinning the demand by individuals for energy, at a time when consumers have been sensitised to the possibility of living in an enhanced greenhouse gas-affected world.

One feature of Sydney's consumption is the change in the late 1990s where the maximum winter demand was, for the first time, overshadowed by a new summer demand. Previously, heating had driven the heaviest power load demands across the city, but the increasing popularity of residential and commercial air conditioners began to show itself.

Responding to Energy Demand and Consumption

The NSW government introduced a requirement that all new dwellings after July 1, 2004 be designed to achieve a 25 per cent reduction in energy demand, and included a requirement that this be extended to all new unit developments after July 1, 2005.

Although the NSROC councils strongly support for the introduction of the Building Sustainability Index (BASIX)

energy controls, there is not a clear picture yet on how effectively or comprehensively these requirements will be enforced before an occupation certificate is granted. BASIX should make an appreciable difference over time to energy consumption, as will the energy used to heat hot water due to water restrictions.

Larger Councils are required to develop energy savings plans, and work is underway to audit energy use in council facilities and minimise consumption through buying more efficient machinery and changing work habits.

The NSROC members have undertaken various initiatives to reduce energy demand across the region as part of their moves to sustainability and reducing ecological footprints. These include community education programs and the application of energy-conservation policies at sites managed by council staff. Cumulatively, these initiatives have the potential to make a substantial, long-term saving in consumption.

Ku-ring-gai Council has recognised there are many opportunities to reduce residential energy consumption. One program has been the fridge buyback scheme (a grant funded program developed by Next Energy), where residents can have any second working fridge removed and recycled, reducing their energy consumption and reducing CO₂ emissions. The program has removed 289 working fridges from Ku-ring-gai homes, reducing total greenhouse emissions 2613 CO₂ tonnes and saving residents a total of \$380,035 in energy costs.

Hunters Hill Council has reduced energy demand by retrofitting the Hunters Hill Town Hall, the council's administration building with compact fluorescent light bulbs and a computer monitor upgrade to LCD monitors. The council retrofitted more than 50 lighting fixtures with 20-watt compact fluores and installed more than 40 LCD monitors. The retrofit is estimated to save more than 10 tonnes of greenhouse gas emission every year, and the monitor upgrade is estimated to reduce monitor energy consumption by 40 per cent. Hunters Hill Council also regularly participates in and supports state-wide regional programs such as Fridge Buyback and streetlight improvement programs.

North Sydney Council continues to address greenhouse gas emissions from its operations through a range of initiatives, including the installation of energy-efficient appliances, renewable energy initiatives, the purchase of GreenPower, waste recycling and use of more fuel-efficient and hybrid vehicles. The council chambers is rated 4.5 stars (of a possible 5) under the Australian Building Greenhouse Rating Scheme and is the only local government building rated among the top 10 green buildings in Sydney.

Photovoltaic Panels have been installed at North Sydney Olympic Pool and the council's Ros Crichton training pavilion. Solar hot water systems have been installed at the North Sydney community centre and the council chambers. Passive solar design, heat pump hot water systems, energy-efficient lighting, lighting timer sensors and improvements to air conditioning have also been implemented at several sites. Council also supports residents, schools and businesses to reduce water consumption and greenhouse gas emissions through the CitySwitch green office program, greenSchools initiatives and a range of community education initiatives, including workshops, events and energy assessments.

In 2007-08, the **City of Ryde** continued working to reduce energy consumption. The Energy Savings Action Plan (ESAP) details a range of energy-saving initiatives across the council's top 12 energy-consuming sites. The plan is 75 per cent completed, resulting in significant savings. A significant action involves an automated access system for floodlighting on all 21 playing fields. The system means the council can control, from a central computer or via SMS messaging, floodlights are turned on and off. This enables the council to reduce energy consumption and costs by ensuring that floodlighting is only activated when needed. Floodlighting can be adjusted when grounds are closed in wet weather, and timing adjustments can be made when the hours of daylight vary.

Efficiencies and consumption reduction programs are well embedded into **Willoughby City Council's** practices and community activities. Efficient technology has been embraced with lighting retrofits and voltage reduction. In-house consumption has been tackled through facilitated workshops and staff working groups. Efficiency and consumption within the community is being fostered through education programs. Programs are also being developed to make it easier and more cost effective to reduce energy use.

Lane Cove Council offered 200 residents the opportunity to have a home eco-audit at a subsidised rate. EcoSmart was contracted to run home eco-audits and present households with personalised energy- and water-saving plans. The council also continues to support the fridge buyback scheme. Lane Cove residents handed in 117 fridges in the program's first two phases and the council anticipates greater participation in the third phase.

As of June 2008, **Hornsby Council** had further cut its greenhouse gas emissions by 29 per cent and helped the community reduce its emissions by 4 per cent of 1995-96 levels. The Earthwise At Home – Low Carb Living program helped 112 households to install low-emission technologies, reducing energy use and emissions by 407 tonnes

a year (plus 155 tonnes from light bulb and shower head refits). Further reductions are also likely because of behavioural changes (more than 330 residents attended energy-saving workshops). The council promoted the fridge buyback program, which has saved 2817 tonnes of greenhouse gases and saved residents more \$427,100 since it began. Further community energy savings have been achieved by businesses participating in the Hornsby business energy savings program. The council has been reducing its own energy use through continuation of Stages 1 and 2 of the energy performance contract, purchase of 10 per cent GreenPower for large sites and all streetlights and 6 per cent for all other sites, a co-generation system at Hornsby Library, solar panels for heating Hornsby Pool, and sensor lights in the administration building.

WATER CONSUMPTION

Water consumption is being increasingly identified as critical Australia, and this also holds true for the northern Sydney region. Like the rest of Sydney, the region has been affected by the recent drought and water restrictions.

Pressure on water resources

Sydney's water resources are under pressure from increasing demand for, and consumption of, town water supplies. Population growth, lifestyle changes and the uncertainty of future climate change make the extent of these pressures difficult to measure. The issue of water resources has become particularly important as Sydney is experiencing a prolonged drought and water reserves are extremely low. Although it is difficult to determine the exact nature of on-going climate change, there is a possibility that historical rainfall patterns will not be repeated and Sydney will face more prolonged periods of dry weather with lower annual rainfall.

Regardless of the repercussions of our intensive use and consumption of Sydney's water, the conservation, protection and management of this resource will not only benefit the environment (through greater environmental flows) but will also save consumers money through reduced demand.

Water consumption in the region

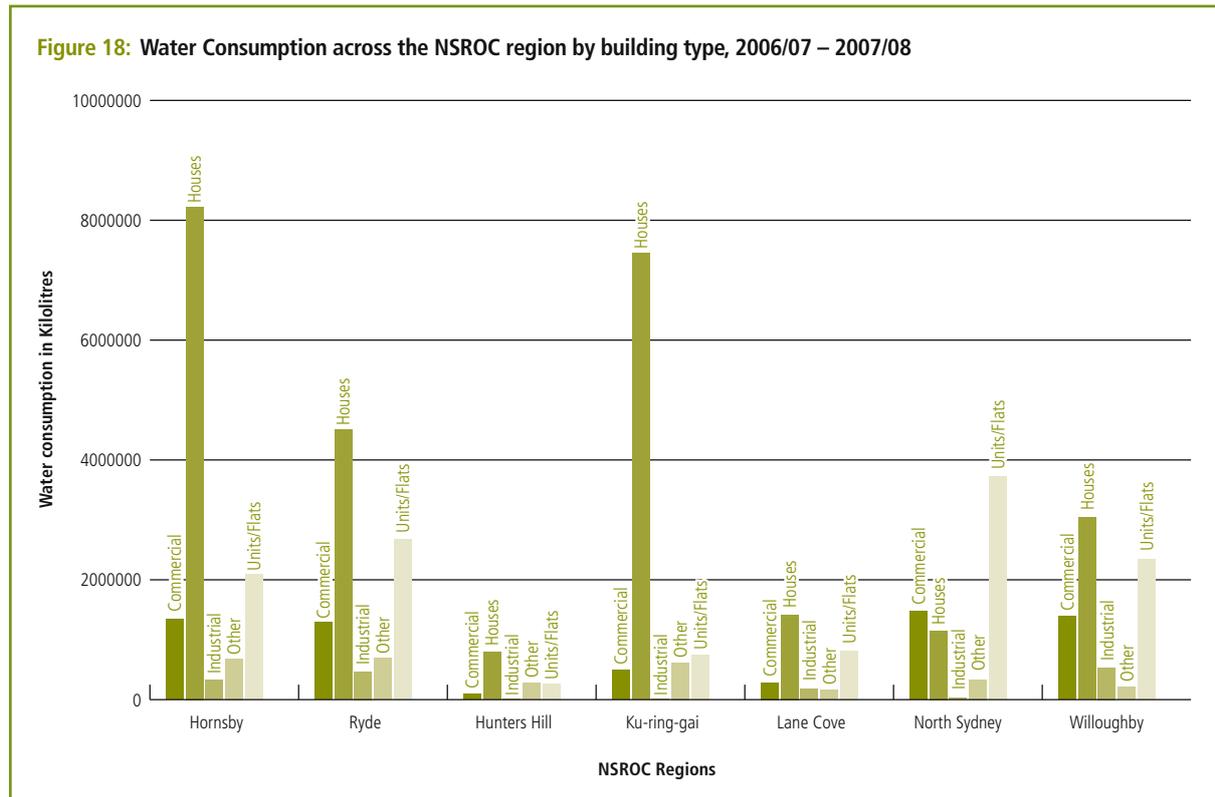
Current rates of average yearly water consumption per property vary throughout the NSROC region. Some have been consistently below Sydney's average in recent years, while others have been significantly above average. The northern Sydney region consumed about 54 million kilolitres of water in 2006-07 (a drop of about 2 million kilolitres compared with 2005-06) with the average house using about 237 kilolitres a year (a drop of 14 kilolitres a year compared with 2005-06).

Figure 17: Total water consumption by LGA in NSROC Region, 2006/07 – 2007/08

LGA	Total consumption in 07/08 (kL)
Hornsby	12662104
Hunters Hill	1426443
Ku-ring-gai	9321664
Lane Cove	2856099
North Sydney	6712829
Ryde	9633902
Willoughby	7513857

**Current water restrictions mean that water consumption in the NSROC region is lower than it would otherwise be.*





*Current water restrictions mean that water consumption in the NSROC region is lower than it would otherwise be.

Meeting the Water Challenge

Safe, reliable water services are essential for supporting a growing population and associated economic activities. Rising demand for water is a significant environmental issue putting catchments under considerable pressure. Although about 90 per cent of water taken from the NSW environment is used for agricultural irrigation, urban water has profound effects on those waterways supplying the water as well as those receiving treated sewage and urban runoff discharges.

The state government released its metropolitan water plan in 2006, aimed at securing Sydney’s water supply by maximising water recycling, encouraging water savings, accessing deep water in dams, reducing leaks and commissioning a large-scale desalination plant. The NSROC councils maintains this desalination plant is undesirable as it will have major environmental impacts, including local impacts and environmental impacts resulting from the significant energy demand it will create.

All NSROC councils have initiated programs to reduce their own water consumption and to educate and help the community conserve water. Measures include encouraging the installation of water tanks, dual-flush toilets, water-saving shower heads, and the planting of native gardens (which require less water). Significantly lower water consumption has been achieved from these measures, and from water restrictions across Sydney.

All councils were required to develop water-saving plans by 2006, in accordance with the Administration Amendment (Water and Energy Savings) Act 2005. This required water-saving measures to be identified and implemented in council buildings and infrastructure. All NSROC councils are members of Sydney Water’s Every Drop Counts program, auditing council facilities and developing plans to achieve tangible water savings. NSROC members have also adopted other water-saving initiatives. :

Hunters Hill Council committed to sustainable urban water management within the council area in early 2008 through its participation in the ICLEI water campaign, an international fresh water management scheme. The council has compiled an inventory of water-consumption data and water-quality issues influenced by its own and its community’s activities. This inventory has identified areas where progress can be made towards sustainable water management. The council will use this data to design a program of actions to achieve sustainable urban water management.

Hunters Hill: Boronia Park Grandstand water savings project



Hunters Hill Council has upgraded toilet facilities at Boronia Park oval grandstand with help from Community Water Grants in an effort to reduce water use. Rainwater is collected from the roof and stored in three 5000-litre tanks. Pumps transfer this water to toilets when they are flushed. Dual flushing cisterns limit the amount of rainwater used so there is enough to last through dry periods. There is enough water stored to supply the toilets all year round, and means no fresh drinking water is wasted. Water-efficient taps and showerheads help reduce the amount of water needed.

These water-saving upgrades have the potential to save more than 300,000 litres of fresh drinking water every year, and this saving is a major contribution to helping the Hunters Hill community move towards a sustainable Hunters Hill. The council is committed to cutting water use and appreciates the support from the Australian government's community water grants.

Ku-ring-gai Council is undertaking a number of projects aimed at reducing potable water consumption. In the 2007-08 financial year, the council awarded an energy and water performance contract which is expected to reduce its water consumption by 2800 kilolitres. After an extensive tender process, the council also awarded the contract for the design and construction of a sewer-mining scheme at Gordon golf course. The design was completed and a DA lodged in 2007-08 with construction expected to start soon. This project is expected to reduce water consumption at the golf course by more than 90 per cent. The council has also finished building a new stormwater harvesting system at Edenborough sportsfield. This will allow reuse of up to 3000 kilolitres of stormwater each year for irrigation purposes. Construction of another two stormwater-harvesting systems was also started in the 2007-08 financial year, and these will be finished early in 2008-09.

Lane Cove Council introduced a rainwater tank rebate scheme for residents who install rainwater tanks with a total volume of 5000 litres or more. An information seminar was held with a representative from the Master Plumbers' Association guiding residents through the process of installing a tank. The council also continues to work through its water savings action plan, identifying water-reduction priorities in the council's facilities.

North Sydney Council has developed and implemented its water and energy savings action plan to reduce water and energy consumption on major sites. The council continues to cut its annual water consumption, with about 109,162 kilolitres of potable water consumed in 2007-08. Water reuse initiatives and water-saving devices have been used to help reduce consumption. Rainwater tanks have been installed at the Crows Nest community centre, Cammeray sportsfield changing rooms, North Sydney community centre and at council's two depots. Water-saving taps, showerheads, dual flush toilets and waterless urinals have also been installed at several sites. The large-scale North Sydney stormwater reuse project harvests, filters and treats stormwater to irrigate high-profile sporting and recreational facilities, including North Sydney oval and Cammeray golf course. The scheme is expected to save 90 million litres of drinking water each year while improving the local environment.

In 2007-08, the **City Of Ryde** has maintained its commitment to reducing water consumption, and has implemented 91 per cent of the actions in the water savings action plan. The council has achieved a 42 per cent saving in total water consumption since 2003-04. The City Of Ryde has sustained this commitment to reducing water consumption by delivering a further saving of 13,753 kilolitres of water in the reporting period – equivalent to a 16 per cent reduction since last year.

The City Of Ryde has also undertaken an irrigation audit to identify gaps in the spray patterns of the irrigation system. The new automated access system for floodlighting has an added application; it will also help monitor irrigation at council fields. This will help reduce overlapping of spray irrigation, making the system more water efficient. The council has also recently finished building a rainwater harvesting system at the North Ryde library and community centre. The project involved the redirection of roof runoff to an above-ground storage tank, and the installation of pumps, water meters and copper services to all toilets in the building. It is estimated the system will reduce potable water consumption by more than 100 kilolitres a year.

Following the success of the council administration building reducing its water consumption by 75 per cent the focus turned to the Willoughby leisure centre. With more than 130 kilolitres of roof water reuse tanks installed, there will be a dramatic reduction in the centre's mains water consumption. The harvested water will be used for pool top-up and irrigation. The council has drawn up an action plan with an annual budget of \$340,000 to implement meaningful water conservation projects for most of its significant water-using sites.

Hornsby Council has maintained its commitment to water reduction and water quality improvement by completing the first five milestones of the Sydney Water Every Drop Counts business program. These milestones serve as a progressive benchmark on how well local governments achieve their objectives and goals for water conservation and water quality management in the corporate and community sectors. Hornsby Shire Council was also one of the first councils in NSW to achieve a 5-star rating accreditation for its water-saving initiatives. The council has maintained last year's water consumption reductions of 21 per cent in its own operations and 20 per cent through initiatives for the community. It's working in partnership with ICLEI, Sydney Water and the Department of Environment and Climate Change to develop water-saving initiatives and sustainability programs. The success of these initiatives can be credited to council programs such as its sustainable total water cycle management strategy, sustainable water DCP, the catchment remediation rate program, stormwater catchment management plans and environmental education.

COMMUNITY HEALTH

Increasingly, councils are becoming involved in community health activities. They recognise the need to provide a range of services designed to benefit all sections of their communities. Particular attention is paid to more vulnerable members, such as children, the aged and the mentally ill. Councils recognise the interdependency of a healthy and happy community, and work towards promoting healthy lifestyles among residents.

Community Health Issues

The northern Sydney region's population is steadily rising, and is also ageing. Supporting a larger population, particularly with increasing dependents, can put pressure on health services and community groups. A growth in population also results in more pollution caused by increased traffic, energy consumption and waste generation. Pressures on community health include lifestyle-related diseases such as obesity, stress and smoking-related disorders (declining in real terms).

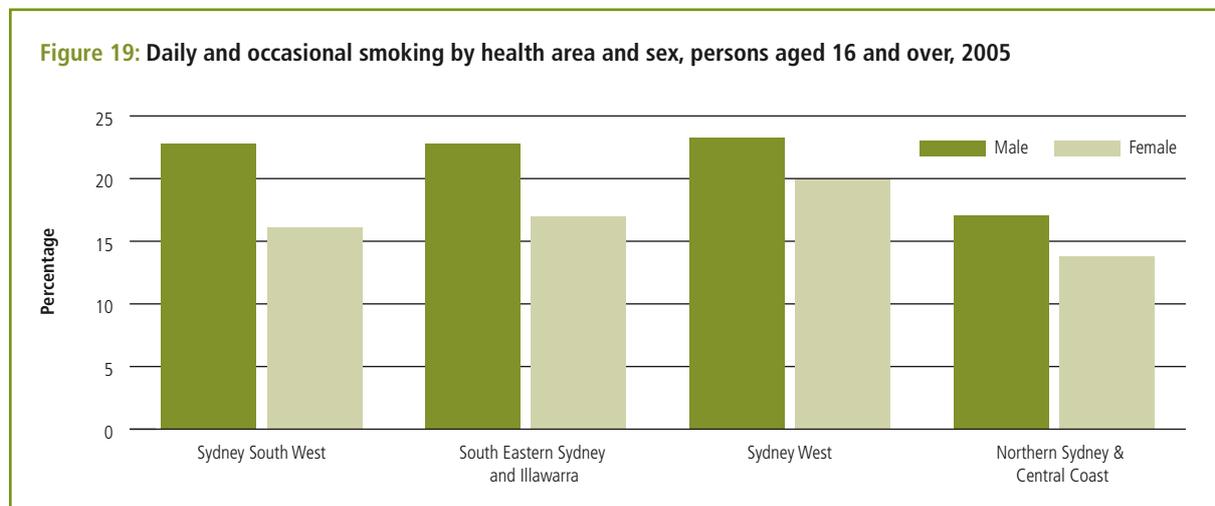
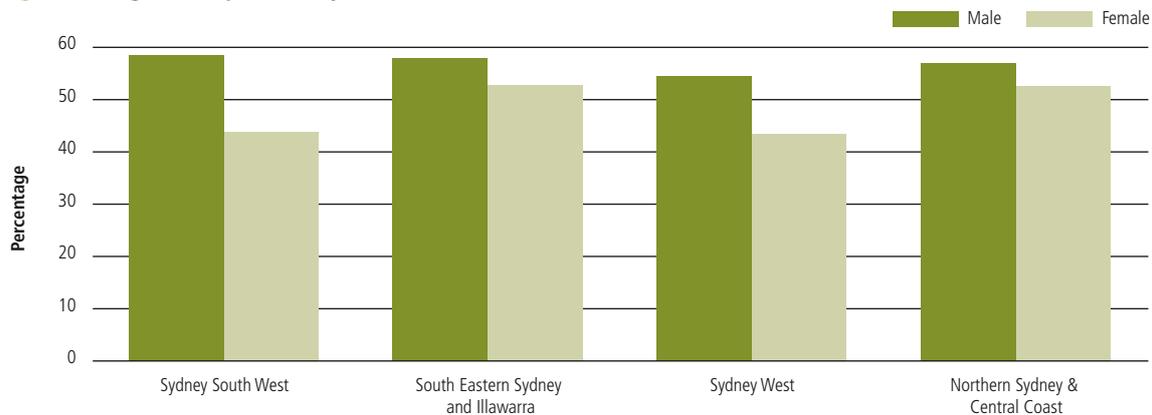


Figure 20: High blood pressure by health area and sex, 2005

Source: NSW Population Health Survey (HOIST)

The Environment and Health

It is difficult to demonstrate broad, direct causality between environmental impacts and community health. Although specific pollution incidences such as chemical spills, exposure to asbestos and heavy metal poisoning can have significant community health implications, many health problems are only discernable over time and after considerable or repetitive exposure. And although councils are not frontline agencies in managing community health, they can play a significant role in managing the environment to minimise the effects on the community, and in working with health agencies and services to educate the community on health-related matters.

At present, the councils at present do not collate robust data on community health issues and must rely on secondary sources to make the link between environmental conditions and the community health. One indicator identified by the NSROC councils is the number of asthma cases reported as an indicator of air quality. It is generally perceived there is a direct link between the two.

Figure 21: Prevalence of Asthma in the community, Northern Sydney Central Coast Community Health Survey 2006 (ages 18 and over)

	LGAs within health service	Asthma prevalence persons (%)	Asthma prevalence female (%)	Asthma prevalence male (%)
Hornsby Ku-ring-gai Health Service	Hornsby Ku-ring-gai	15.0	12.1*	14.7*
North Shore Ryde Health Service	Hunters Hill Lane Cove Mosman North Sydney Ryde Willoughby	14.4	11.5*	16.3*
Northern Beaches Health Service	Manly Pittwater Warringah	14.0	10.7*	13.3*
NSW "ever diagnosed" *	N/A	19.2	20.4	17.9
NSW "current asthma" *	N/A	10.4	12.0	8.8

Unless otherwise stated all data is derived from the 2006 Northern Sydney Central Coast Community Health Survey (ages 18 and over), data is weighted to the population.

* These results are based on raw score and have not been weighted to the population, generally the study over sampled those over 55 and undersampled those under 30.

NSW State data consists of weighted scores from the 2005 Report on Adult Health from the NSW Population Health Survey (ages 16 and over).

Helping Our Communities Stay Healthy

Councils in the NSROC region work closely with the community to provide services, information, education and areas for relaxation to encourage and maintain a healthy and active population. They often take a co-ordination, support and referral role in providing services to the young, elderly, disabled and mentally ill.

The **Hornsby Council** food-inspection program has a risk-based approach, with the categorisation of businesses according to the type of food business and the handling practices associated with the sale and or service of the food. To help ensure food safety and to help protect public health, inspections are scheduled for those food businesses classified as of high and medium risk. Some 90 per cent of all food businesses classified as high and medium risk received at least one scheduled inspection in the year. Risk assessment is based on potential critical food-handling practices. Those identified with problems – which means they are likely to have produced or produced unsafe or unsuitable food – are given a ‘fail’ result. Mandatory follow-up inspection/s are undertaken to ensure compliance.

To further their commitment to seniors, **Lane Cove Council** has continued for a second year with the HEART program (Healthy Eating and Recreational Time). This offers seniors the opportunity to take part in a series of cooking classes focussing on different cuisines such as Chinese and Indian, and simple meals they can cook at home. To celebrate what participants learn in the classroom they later share a lunch in a local café of the same cuisine.

CASE STUDY

North Sydney Council Healthy Eating in Schools Project

“To deepen students’ understanding of healthy eating and gardening.”

North Sydney Council supports the development of a healthy-eating-in-schools project at the coal loader community garden. This project promotes the connection between food and healthy lifestyles, and aims to develop practical gardening skills which students can continue using at home.

Although North Sydney may not have the same levels of childhood obesity as other LGAs, it is important to counteract the strong junk food marketing messages for junk food aimed at children, and consultation with the community and service providers has highlighted healthy eating and exercise as an important issue across the community.

There are various ways of addressing the issue in the North Sydney LGA. The council and Northern Sydney Central Coast Area Health Service have already worked on one project at the North Sydney Olympic pool to increase the availability of healthy food on the menu at the pool’s kiosk. The community garden project is seen as a natural progression from this. The initial project trial includes 62 students from Years 3 and 4, visiting the site once a week for eight weeks.

The project objectives are:

- to deepen students’ understanding of the benefits of healthy eating
- to broaden students’ attitudes towards growing and eating fresh local food

- to develop students’ skills in growing their own fruit and vegetables
- to foster community participation
- to deepen students’ understanding of the link between food production and purchasing, and sustainable lifestyles
- to deepen students’ understanding of food chains and lifecycles
- to ensure the project’s sustainability

The first stage of the work to develop the coal loader sustainability centre will start early in 2009. Part of this work will include developing an environmental centre. The existing garden will become the operational area. However, a new garden will be developed on the platform at the site. Planter boxes being used for this project were selected specifically because they could be relocated easily.



A similar program has been introduced at the Synergy Youth Centre, where Friday night cook-ups ensure local young people are treated to a healthy meal at the end of each week and can learn important life skills. A different meal is selected for each session, thereby exposing young people to a range of healthy options and culinary traditions. Pre-dinner games of soccer and touch football ensure attendees work up an appetite, and the screening of a meal-time movie provides further encouragement to stay for the meal.

North Sydney Council, in partnership with NSW Health, is promoting child and adolescent mental health and North Sydney carer support services through the Bradfield Park community centre carers' program. Initiatives include an eight-week introductory film-making course that teaches scriptwriting and storyboarding, camera craft, lenses, lighting and editing. Other creating wellbeing initiatives include pottery, painting, puppet making and photography courses at the North Sydney community centre, and the Chillout Café on Friday mornings at Kirribilli neighbourhood centre. This partnership between the council, the Kirribilli community centre and Northern Institute of TAFE provides work experience for people with mental health problems looking to develop careers in hospitality.

Hunters Hill Council has been striving to meet goals outlined within its social and cultural plans. Supporting activities for seniors including walking groups, ferry cruises, gentle exercises and table tennis have all benefited elderly residents. Youth activities have included a number of successful skating days. Children's services have been supported through library school holiday activities and storytelling. Local playgrounds have also been refurbished.

Offering a range of enjoyable recreation programs in a relaxed, social setting, **Ku-ring-gai Council's** active Ku-ring-gai program provides local and affordable activities to encourage residents to remain active and enjoy the LGA's parks and recreation facilities. This year, 158 residents participated across the eight programs available, with the most popular activities being yoga, social tennis and gym-without-walls. This year, online booking forms were created for all activities, making it more convenient for residents to sign up. Three new classes have been offered in 2008 including dancefit, fitball and fungame, along with extra sessions of the more popular programs.

The contribution of local government in partnership with the Immunise Australia program is acknowledged as an essential strategy for maintaining high state levels of immunisation coverage – currently exceeding 90 per cent. The **City of Ryde** immunisation program consistently figures as a major influence on high immunisation uptake figures for the northern Sydney region. New client enrolments continue, and on average 90-100 children attend for immunisation on clinic days. The immunisation clinic is an ideal venue for distributing information for the health and well-being for early childhood, as well as other community information.

Willoughby City Council has worked in partnership with a range of organisations to help its community address health issues such as social isolation and mental wellbeing. The council's MOSAIC multicultural centre has made an effort to include an element of physical activity in its regular group activities provided to its culturally and linguistically diverse communities. Ten social groups based at the MOSAIC centre practise either Tai Chi, folk dancing or yoga as part of their weekly programs. Sustainability has been successfully integrated by incorporating a number of interpretive bushwalks and other environmentally focussed activities.

Another major youth initiative was the **North Sydney, Lane Cove and Willoughby City Council** event, Shoreshocked. Held since 1992, Shoreshocked – the Lower North Shore's only free, large-scale youth event – has grown from hosting a few rock bands and attracting a few thousand people to attracting more than 8000 young people entertained by more than 30 bands and DJs.

Figure 22: Adequate physical activity by health, area and sex, persons aged 16 and above, 2005.

Area	Male/Female	Percentage
Sydney South West	Male	58.4
	Female	43.7
South Eastern Sydney and Illawarra	Male	57.9
	Female	52.8
Sydney West	Male	54.5
	Female	43.5
Northern Sydney & Central Coast	Male	56.9
	Female	52.6

Source: NSW Population Health Survey (HOIST)

Bushland and Biodiversity

The NSROC region covers more than 680 square kilometres and includes more than 7000 hectares of bushland. Some of the largest tracts of bushland in the Sydney metropolitan area are located in the region. The condition and management of bushland is particularly important to residents, and the amenity provided by bushland is one of the reasons they choose to live and work there. For example, a survey of Hornsby Shire residents in 2002 ranked the importance of protecting natural bushland at the top of a list of 24 issues. (Noonan 2005)



BUSHLAND MANAGEMENT

Northern Sydney is privileged to be surrounded by national parks such as the extensive Ku-ring-gai and Murrumbidgee National Parks to the north, and includes important areas of native bushland within its borders. Native bushland is highly valued by the community for its cultural, recreational and aesthetic values. It contributes to air and water quality and provides unique habitats which are essential for the preservation of native flora and fauna species. The conservation of bushland is critical to the protection of biodiversity – the variety of different plants, animals and micro-organisms, their genes and the ecosystems of which they are a part. Bushland's economic value includes its significant contribution to local economies through tourism and leisure related activities.

The Challenge of Conserving Bushland

Native plants and animals, and the remnant bushland are visible signs of the ecosystem functioning in urban areas. To protect this local biodiversity it is critical to conserve native vegetation and wildlife. Some of the pressures on the bushland vegetation and wildlife in the NSROC area include:

- clearing of bushland for housing, roads and industrial developments
- adverse human impacts – weeds, rubbish dumping, encroachments, impacts of pets
- structural changes to the bushland – decreased species diversity including tree death, removal of habitat, changes to fire regime, increased soil nutrient levels
- changes in drainage – stormwater runoff
- destabilisation of water courses – erosion, scouring flows, increased sediment loads and nutrient pollution

Urban development has severely affected bushland areas and biodiversity in the Sydney metropolitan area, with only about 12 per cent of the city's original bushland remaining. The metropolitan strategy being developed by the state government has recognised biodiversity conservation as one of the central environmental challenges we face. This is critical in planning for continued urban growth to provide for Sydney's expanding population.

CASE STUDY

Hornsby Council wins the Yates, Nursery & Garden Industry Award!

Hornsby Council has managed its community nursery site for more than 10 years, allowing it to provide a range of plants for street trees, bush care and other projects. In 2000, the council's bushland beam took over part of the nursery grounds and transformed it into a community nursery, providing local native stock for a number of community projects. To finalise its potential as an educational facility and to run the nursery according to the council's best management standards, the nursery sought NGIA advice on accreditation. Over three years, the nursery has undergone improvements, and in June 2005 received accreditation through the Nursery and Garden Industry Accreditation Scheme, proving it's run at best practice and is environmentally sound. The Hornsby community nursery is the first and only government-owned nursery in NSW to receive this accreditation.

The nursery aims to showcase best-practice operations across the wider community. This is achieved through many initiatives including a full water recycling system capturing onsite runoff rainfall, solar power, minimal waste generation,

recycling of materials and a low reliance on chemicals. To emphasise this commitment to environmental sustainability the nursery was awarded the environment category award for the state of NSW (2008) in the Yates Nursery & Garden Industry Awards. Awareness of the nursery facility across the broader community has risen strongly in the past financial year, and is highlighted by the increase in the numbers of plants given out at the community nursery and environmental information open days. Numbers this year were up 80 per cent on the previous year, to a total of 3,522 plants distributed to residents.



The *Threatened Species Conservation Act 1995* protects all threatened NSW native plants and animals (with the exception of fish and marine plants). It recognises clearing of native vegetation as a major factor contributing to loss of biological diversity. The NSW scientific committee established by the act identifies the following effects of clearing native vegetation on biodiversity:

- fragmentation of areas of native vegetation separating contiguous areas of habitat and reducing gene flow between populations
- deterioration of water quality, sedimentation and reduction in aquatic biodiversity following clearing of riparian native vegetation
- increased greenhouse gas emissions
- establishment and spread of weeds and other exotic species
- loss of habitat for native fauna
- loss or disruption of ecological function as complex communities are disturbed and local populations may become extinct

Existing Bushland in the Region

Most of the NSROC's bushland areas can be found in north, which includes many relatively undisturbed tracts protected within national parks. Most vegetation is confined to nutrient-poor sandstone-based soils in steeply sloping areas and gullies. However, remnants of plateau vegetation found on shale and transitional soils, such as the Blue Gum High Forest and the Turpentine-Ironbark Forest, can still be found. Native bushland has an important ecological role in binding soil matter, maintaining infiltration, absorbing water and greenhouse gas sequestration.

The largest member of NSROC, **Hornsby Shire Council**, is known as the bushland shire because of its extensive bushland areas and scenic amenity. Bushland areas cover more than 65 per cent of the shire with the council managing about 5750 hectares. This includes the 3830 hectare Berowra Valley Regional Park, jointly managed by the council and the DECC.

Hunters Hill Council LGA has 30 hectares of remnant bushland on public land, mostly located along creeks and foreshore edges. Although small in area, along with Lane Cove, these areas of bushland provide a valuable link between Sydney Harbour and Lane Cove National Park. Considering the extent and intensity of urban development as well as the proximity to the Sydney CBD, these bushland areas are significant not only on a local, but also on a regional scale.

Adjoining bushland on public space along the Lane Cove River foreshores is privately owned land, and benefits from a 50 metre foreshore protection zone. This area is covered by a site-specific development control plan whereby no building is allowed within 50 metres of the foreshore, and remnant vegetation has to be retained.

In **North Sydney Council** there remains almost 50 hectares of bushland located mostly on the foreshores of Middle Harbour and Port Jackson. This represents only 4.5 per cent of the original bushland cover. Despite this relatively small area of bushland, the variety of habitat types and their proximity to larger bushland areas in neighbouring council areas result in a surprisingly diverse array of native flora and fauna species. The council is committed to the ongoing conservation and recovery of these areas for the benefit of the community and the bushland's own intrinsic value.

The **City of Ryde** has 355 hectares of parkland divided into 207 parks of which about 205 hectares is classed as natural bushland. This gives an average size of 1.72 hectares; in reality venues vary in size from the smallest (less than a single house block) to the largest (the Field of Mars Reserve, an area of 51 hectares). The main aim of bush regeneration and management are to regenerate, protect and preserve urban bushland areas within the LGA for the enjoyment of future generations.

Willoughby City Council recently resurveyed the native bushland that occurs within the city using aerial photography. As a result, the reported area has increased. There is 338 hectares of native bushland in Willoughby of which 83 hectares is national park. This represents 15 per cent of the original bushland cover.

In **Lane Cove Council**, 90 per cent of bushland has been cleared since European settlement, leaving 90 hectares on public land.

Ku-ring-gai has more than 100 bushland reserves comprising 1100 hectares of bushland. The LGA also adjoins three national parks (Garigal, Lane Cove and Ku-ring-gai Chase). Most bushland reserves are small, isolated pockets of less than one hectare, with most bushland held in 10-12 larger reserve areas. The major reserves are continuous with adjoining National Parks, and form valuable wildlife corridors.

Figure 23: The size and proportion of bushland in the NSROC Region by LGA, 2007/08

Council	Total area of bushland in LGA (hectares)	Total area of bushland in LGA under council control (hectares)	Total area of bushland in LGA under active council management (% management)
North Sydney	50	50	100
Lane Cove	123	93	75
Hunters Hill	40	30	70
Ryde	559	209	40
Ku-ring-gai	3,148	1,161	37
Hornsby Shire	34,540	5,750	11
Willoughby	338	290	85
NSROC	38,798	7,583	20

Conserving our Bushland

Councils have responsibility under the *Threatened Species Conservation Act 1995* and the *Environmental Planning and Assessment Act 1979* for conserving and protecting threatened species, populations and ecological communities of flora, fauna and their respective habitats. The northern Sydney councils manage this bushland, including bushland regeneration, noxious weed control, noxious weed inspections on private lands, bushland track construction and maintenance, and feral animal control.

They provide further management through an array of specific planning instruments and development assessment processes. Development applications for land containing bushland or adjacent to bushland are assessed for their potential effects on that bushland, fauna habitats and threatened species, populations and endangered ecological communities or their habitats. Councils must comply with planning legislation and policies such as the *Environmental Planning and Assessment Act 1979*; the *Threatened Species Conservation Act 1995*; and various state environmental planning policies, local environmental plans (LEPs) and development control plans when making these assessments.

The northern Sydney councils employ professional bush regenerators who – as well as helping to regenerate the bush – undertake ecological and hazard-reduction burning, track construction and maintenance, and pest species control. Bush care groups across the region also involve the community in restoring degraded bushland in their neighbourhoods. More than 1530 bush carers work in Hornsby Shire, Ku-ring-gai and Ryde areas to restore degraded bushland environments in their local neighbourhoods and to promote community awareness.

The councils also undertake on-ground works to maintain and rehabilitate bushland areas. For instance, Willoughby City Council's bushland regeneration program includes:

- bush regeneration – including maintenance weeding, primary and secondary weed removal, weed control through flaming & habitat creation
- walking track maintenance
- ecological burning
- post-fire weed control following a burn
- manual fire hazard reduction
- noxious weed control
- revegetation
- stormwater impact mitigation

By definition, bush regeneration is “the systematic removal of weeds to allow native plants to establish”. A variety of techniques can be used to achieve this, including manual, chemical, mechanical and biological means, as well as fire. Bush regeneration requires long-term commitment to a site.

Hornsby Shire Council is conducting a long-term bush regeneration program on 60 separate sites using several professional bush-regeneration contractors who provide monthly reports for each of their sites, and end-of-financial-year reports. Council officers monitor sites, supervise work progress, and inform local residents of contract bush regeneration works in their area.

Bushland management continues to be an integral part of the council's service to the Lane Cove community. Joint

projects between the two smallest NSROC councils, **Hunters Hill Council** and **Lane Cove Council** are proving to be successful with the partnership continuing to strengthen through joint bushcare activities and management projects.

Hunters Hill Council has about 85 bushcare volunteers working across eight sites. Bushcare working bees generally occur once a month, and activities include bush regeneration, planting and spot lighting flora. Bushcare groups compliment the work of contractors in the reserves.

Despite **North Sydney Council's** relatively small area of bushland (50 hectares), the variety of habitat types and their proximity to larger bushland areas in neighbouring LGAs result in a surprisingly diverse array of native flora and fauna species. The council is committed to the ongoing conservation and recovery of these areas for the benefit of the community and bushland's own intrinsic value.

North Sydney Council co-ordinates bushland rehabilitation activities at 12 sites around the Port Jackson & Middle Harbour foreshore. Activities include weed control, facilitated natural regeneration, track maintenance and site stabilising activities, and are undertaken by council bushland staff, professional bush regeneration contractors and bushcare volunteers. The council's adopt a plot program continues in Cremorne and Wollstonecraft. The success of the Cremorne Point adopt-a-plot project was demonstrated by the higher-than-anticipated participation rates. A large proportion of the reserve has been 'adopted', and bush regeneration has been done on previously untouched, weed-infested slopes. The resident white-browed scrubwren was continually monitored throughout the project and provided an indicator for the rate and pattern of clearing of lantana, the scrubwren's key habitat in this reserve.

The management of bushland is a top priority for **Ku-ring-gai Council**. This year in partnership with the federal government and the community, through the Blue Gum High Forest action group, the council secured the purchase of the last significant parcel of private land containing the critically endangered Blue Gum High Forest ecological community. This joint effort represented four years of intense lobbying by the council and the community across all levels of government. The council also started what is possibly one of the most detailed vegetation-mapping projects to identify the location and condition of the LGA's three endangered and critically endangered vegetation communities listed under the Threatened Species Conservation Act. This is a collaborative project with two catchment management authorities, the Department of Environment and Climate Change and Sydney's Royal Botanic Gardens, and builds on the innovative mapping of 220 kilometres of riparian systems completed in 2005.

The council also adopted an encroachment policy designed to manage the LGA's 89kms of bushland interface. Across the area of climate change, the first energy- and water-conservation contract was awarded that will eliminate 440 tonnes of CO₂ emissions. The second of 12 stormwater harvesting projects was completed, with the next three scheduled to be built in 2007-08. A further innovation within the water-management area saw the execution of a contract for the second only sewer mining plant in NSW that will save 60 million litres of water a year.

Recent additions to **Willoughby City Council's** regeneration program have included wetland areas. Work at Scotts Creek consolidated remnant native vegetation and reduced islands of weeds along the riparian zone. Ongoing work at Sailors Bay, and along Lane Cove River and Swaines Creek is reinforcing the zones of salt-marsh and estuary vegetation. This year saw the completion of the council's second round of e.restore funding. In this five-year period, the levy funded projects to preserve wildlife, restore creeks, increase environmental education, prevent pollution and protect the natural environment through the Streets to Creeks program.

The **City of Ryde** has continued supporting its bushcare program through the management, supervision and training of bushcare volunteers. The council has provided several short training courses through Ryde TAFE to further the skills of these volunteers. These short courses have received strong support and interest, and are programmed to continue.

OPEN SPACE

The NSROC region offers a wide range of open space and recreational facilities. There a number of sporting and leisure facilities of regional standing, including North Sydney oval, Ryde aquatic centre, Willoughby leisure centre, North Sydney Olympic pool and Luna Park. There are also extensive natural areas within the Lane Cove, Ku-ring-gai Chase, Garrigal and Murrumurra National Parks

Outdoor sporting facilities within the region tend to be multi-purpose, and cater for more than one sport. They contribute to the network of open space, provide relief from the urban environment and cater for passive recreational opportunities.



Lane Cove Council – Backyard Habitat Program

In January 2008, **Lane Cove Council** launched its backyard habitat program with a plant giveaway, information stall and wildlife show in Lane Cove Plaza. The program aims to increase biodiversity by encouraging residents to develop wildlife-friendly gardens that provide habitat and food for native fauna. This is achieved through:

- workshops on topics such as making your backyard fauna-friendly attracting birds to your backyard and creating a frog habitat
- an information pack and fence sign for those residents who join
- one-on-one backyard consultations complete with a report

All Lane Cove residents are eligible to attend the workshop series and join the program. However, only

those residents backing on to bushland or within identified wildlife corridors are eligible for one-on-one consultations. These wildlife corridors connect core bushland areas, and connect with the corridors of neighbouring councils, allowing fauna to move more easily between bushland areas.

The launch and workshops were well attended and the program now has 106 members, almost all of whom live within wildlife corridors. The one-on-one consultations have been popular, with a two-month wait for consultations. Most residents who have signed up are not current bushcare volunteers, which indicates there are residents who still want to become involved in bushland conservation without necessarily joining bushcare groups. This program has ongoing funding and is certainly looking to continue its success.

Open Space Demand

Demand for outdoor sporting facilities in most parts of the region exceeds supply during peak playing periods, such as Saturdays. Some schools in the area have no or limited sporting fields, and rely on these public facilities.

On-going population growth is expected to exacerbate supply problems by increasing the overall numbers of people wanting to use open space. Schools' reliance on public sporting facilities is also expected to rise as student populations grow. Unfortunately, there is limited opportunity for future development of new open spaces within the region. This is because of existing urban development, prohibitive costs of buying sites, topography, and adjacent bushland and natural areas. Ongoing requirements for sports ground rectification, upgrading and maintenance, as well as water restrictions, put additional pressures on the ability of sports fields to carry additional activities.

Managing Our Open Space

NSROC councils work with the community to maintain a significant amount of open space and to ensure the region remains a safe, healthy and attractive place to live. Within the region, there is 3615 hectares of council-managed open space, amounting to some 69 square metres per person.

Figure 24: The total area of open space and area of space per capita for councils within the NSROC region, 2007/08

Council	Volume of open space under council management in hectares	Volume of open space per capita (square metres)
North Sydney	145	25
Lane Cove	157	49
Hunters Hill	67	50
Ryde	355	36
Ku-ring-gai	1,161	114
Hornsby Shire	1,285	170
Willoughby	425	62
NSROC	3,595	67

Responding to Community Needs for Open Space

Communities in the NSROC region place high importance on effective management and retention of open space. Councils have developed management plans their significant open-space assets, and these are regularly reviewed with the community. The councils also continue to upgrade open spaces with the help of state and federal government grants such as the NSW Greenspace program and the sharing Sydney Harbour access program.

Despite limited capacity for new or extended open space, work is done within NSROC councils to improve existing facilities for both active and passive recreation, including playground and picnic facilities. Maintenance and upgrading is done to improve the functional and aesthetic qualities of councils' developed open spaces, with particular attention being paid to safety.

FIRE MANAGEMENT

Although Australia's ecosystems have evolved in the presence of fire, there is little information on the impacts of altered fire regimes on the biodiversity in NSW. (*Department of Environment and Climate Change, 2000*)

Fire has a complex effect on native ecosystems and communities depending on the season, the frequency and intensity of the fire regime, while different ecosystems react differently to fire, and reactions vary according to the regime imposed. Hazard-reduction burns are an important fire regime tool used to ensure that when a spontaneous bushfire does occur, the risk to human life and property is minimised.

The Bushfire Threat

Ongoing residential development and climate change provide significant pressures on the fire-management regimes of NSROC region councils, particularly Hornsby Shire and Ku-ring-gai Councils. Considerable bushland borders private property. The possibility of bushfires is therefore a significant concern – especially for owners of properties edging bushland. Maintaining a balance between protecting property and life, and maintaining biodiversity is difficult, especially as the best fire regime for maintaining biodiversity in each plant community is not well understood.

Bushfire Risk in the Region

In the northern part of the NSROC region, bushland abuts a number of private properties and the possibility of bushfires provides a constraint for new development and redevelopment. In Hornsby Shire Council for example, large areas of land interfacing residential development and bushland have been assessed as medium to high bushfire hazard. The *Rural Fires and Environmental Assessment Act 2002* requires local governments to record on



Willoughby Council Fire Ecology Workshop

Willoughby City Council, in conjunction with the Nature Conservation Council, conducted a workshop to demonstrate Willoughby's ecological burning program. It was attended by representatives from local government agencies, the Nature Conservation Council, the Rural Fire Service and NSW Fire Brigades from across Sydney.

The group visited five sites in various stages of regeneration after fire throughout the Willoughby LGA. Topics discussed included reintroducing fire into

fragmented bushland, maintaining habitat diversity in small reserves, reducing fuel loads in ecologically sustainable ways, preparation of sites before burning, a practical approach to reading fire history and ecology, how to achieve effective results with limited resources, determining the right time to burn, using fire as an effective bush regeneration tool, and forming a support network for the future.

There was so much enthusiastic discussion that a second workshop has been planned for next year.

maps the land identified by the commissioner of the NSW Rural Fire Service as bush fire-prone land. Councils are required to prevent development consent being granted for certain purposes on bushfire-prone land, unless the consent authority is satisfied the development conforms to documented bushfire-protection specifications or has consulted with the commissioner.

Figure 25: Fire management by Council within each LGA in the NSROC region, 2007/08

Council	Number of sites of hazard reduction burns	Area burnt (by hectare)
North Sydney	7	1.3
Lane Cove	3	1.7
Hunters Hill	0	0
Ryde	1	1
Ku-ring-gai	5	28
Hornsby Shire	14	165
Willoughby	3	4.2
NSROC	33	201.2

Hazard Reduction in the NSROC Region

Fire management is done in co-operation with the DECC, community fire units, local bushfire brigades, the NSW Fire Brigades and the NSW Rural Fire Service. Bushfire control measures, including hazard reduction burns, are undertaken. Although these protect property from bushfire hazards, they can also affect biodiversity. Controlled burns change the natural bushfire regime in terms of frequency, season and intensity. This can effect the capacity of native species grow, flower and produce seeds, and of those seeds to germinate. (*Noonan 2005*)

Four of the NSROC councils have joined to manage hazard reduction in the region. Hunters Hill, Lane Cove, City of Ryde and Willoughby bushfire management committee work with the NSW Fire Brigade to produce a bushfire fuel-management program, which forecasts planned hazard reduction and ecological burns. Information contained in this plan includes:

- maps showing location, zoning and area of burn
- risk assessment
- asset protection
- site description and vegetation classification
- fire history
- fuel layers

The plan ensures predictable bushfire management outcomes for each council. By outlining the prescribed burns for the next three years, this program allows councils and the NSW Fire Brigade to efficiently plan and implement burns across their LGAs.

With the training of council staff to help the NSW Fire Brigade, **Lane Cove Council** conducted three hazard reduction burns in key strategic areas down the Lane Cove River valley. Removing most ground material, regeneration has improved the plant diversity along with reduced re-sprouting of weed species. Hazard reduction is done by hand at bushfire sites to remove fallen branches, leaf litter and large amounts of green waste, old timber and other rubbish dumped in reserves by nearby residents. Some tree trimming is also done on public land, including where tree branches overhang buildings. Controlled burns are used to keep fuel loads down so that fires can be more easily controlled. However, controlled burns change the fire regime in terms of intensity, frequency and season, and can affect a species capacity to regenerate.

Pressure to undertake broad-area prescription burns in the **Hornsby LGA** continues to rise given continuing challenges posed by climatic and local weather conditions. Manual works continue because of environmental constraints restricting the prescription burn program. Investigations into alternative strategies to hazard-mitigation activities such as prescription burning are being undertaken – for example, targeted community education.

North Sydney Council is part of the Manly-Mosman-North Sydney bushfire management consultative committee, which forecasts planned ecological and hazard reduction burns. Hazard reduction is done in accordance with the NSWFB bushfire risk management register, and consists of hand removing fuel, lifting, trimming and thinning of continuous canopy, and controlled pile burns. The council undertakes ecological burns throughout its bushland, with the aim of increasing and maintaining biodiversity across a number of different ecological communities. In 2007, the council conducted three broad-area burns and seven pile burns, totalling an area of 1.25 hectares. Across the burn sites, six previously unreported native species have been recorded in the regrowth.

Ku-ring-gai Council is responsible for managing 1100 hectares of bushland. Much of this is contiguous with larger natural areas – Ku-ring-gai Chase National Park to the north (with 14,882 hectares), Lane Cove National Park to the south-west (with 601 hectares); and Garigal National Park to the east (with 2150 hectares). Managing the fire risk is a shared responsibility with a number of state and local government agencies through the Hornsby Ku-ring-gai district bushfire management committee and residents. The management of fire breaks, fire trails and hazard reduction burning are the council's main tools for managing risks. This year saw 10 priority hazard-reduction burns.

In the **City of Ryde** unseasonal weather patterns severely hampered the 2006-07 prescription burning program resulting in no areas having a hazard-reduction burn. The council has continued its asset-protection program, manually reducing fuel loads and preparing sites for hazard reduction burns in more than 10 hectares of natural area. The council has also continued maintaining and repairing established fire trails and breaks throughout the LGA. The City of Ryde continues to work closely with NSW Fire Brigades (which undertakes the hazard-reduction burns) and with surrounding councils – Hunters Hill, Lane Cove and Willoughby – and Lane Cove National Park in managing the prescription burning program as part of the Hunter's Hill, Lane Cove, Ryde, Willoughby bushfire management committee.

In 2007-08 **Willoughby City Council**'s hazard reduction team undertook three substantial asset protection/ecological burns in the Middle Harbour area on Hawkesbury sandstone soils. The two largest were at Harold Reid Reserve, on a northern slope, and at North Arm Reserve on a southern slope.

INTRODUCED FLORA AND FAUNA

Feral animals and free-ranging pets disturb and prey on native marsupials, birds, reptiles and amphibians. They also use habitat that would otherwise be used by native species and may be responsible for spreading disease to native animal populations. Native fauna is also at risk from death or injury on the roads.

Feral Animals, Pests and Invasive Weeds

Introduced species displace native ones, reduce biodiversity, reduce farm and forest productivity, affect human and animal health and contribute significantly to land degradation. The introduction of feral animal species – in particular, foxes and cats – has led to the decline of native mammals, birds, reptiles and frogs through predation and competition for food and habitat. Introduced plant species or weeds compete with native plants for sunlight and space and reduce natural vegetation, which can impact food and habitat availability for native fauna.

Status of Introduced Species

Weeds are a huge economic burden for NSW and are a major problem in the NSROC region's bushland areas. For example, in Hornsby there are 42 species on the noxious weed list, including lantana, pampas grass, castor oil plant and blackberry, along with aquatic plants such as alligator weed, water hyacinth and salvia. Weed invasion threatens the Blue Gum High Forest and Sydney Turpentine-Ironbark threatened plant communities in Ku-ring-gai.

Water Primrose (*Ludwigia peruviana*) has now been found in Hornsby Shire and control on this infestation started immediately. *Paspalum quadrifarium* is now invading some local bushland reserves predominantly from road edges and drainage lines. It out-competes other plant species and is difficult to eradicate.

Noxious weeds include:

- Alligator Weed
- Pampas Grass
- Blue Grass
- Ludwigia
- Bamboo
- Asthma Weed
- Privet
- Salvinia
- Willow
- Madeira Vine
- Morning Glory

CASE STUDY



Hunters Hill Bushcare Site Action Plans

Bushcare site action plans for 2008 were completed for the following sites – Betts Park and Gladesville Reserve, Kellys Bush, Boronia Park, Ferdinand Street Reserve, Riverglade Reserve and Buffalo Creek. They were developed in consultation with the volunteer bushcare convenors interested in helping. The action plan identifies working bee areas, which are mapped. Activities for every working bee are listed for the year.

Managing the impacts of introduced species

The NSROC councils employ a variety of techniques to manage introduced flora and fauna, focusing on those identified as feral animals, pest species or noxious weeds.

All NSROC councils work with National Parks and Wildlife Service to control pests in accordance with state-wide priorities such as the fox threat abatement plan and regional pest management strategies. Since 2000, NSROC councils have been involved in the Sydney-North Regional fox baiting program. Foxes are identified as a high-priority pest, while rabbits are medium priority pests, and feral cats are a lower priority. As animals do not respect land tenure, collaborative programs are essential or reducing their effects (*National Parks and Wildlife Service 2005*).

The program's aim is to protect native wildlife, especially threatened species from fox predation.

Evidence is emerging that local native species, such as swamp wallabies, brush turkeys and lyre birds are making a comeback after fox baiting, with sightings where they have not been seen for more than 20 years. Cats are trapped only in bushland where there are identified environmental effects from non-domesticated animals. Rabbits are controlled when they affect bushland.

The Indian myna, an introduced bird species, has also been targeted in urban areas. This action is mainly in response to a perceived abundance of the species and their threat to native birds. It has involved the trialling of specific cage traps designed for controlling this pest species.

Weed species are primarily managed through bush regeneration and by council park staff. Park staff maintain a mowing, spraying, slashing regime aimed at minimising weed dispersed from the reserves. At the same time, contract and volunteer bush regenerators work in bushland and areas of remnant vegetation.

Councils have developed their own weed-control programs tailored for local conditions. Program policies outline the councils' weed-management philosophy in light of relevant legislation and community concerns, and provide guidance for various other programs. All councils continue to distribute community information on noxious and environmental weeds. Bookmarks, booklets and other information are regularly distributed at community events to new bushland neighbours and other residents.

Willoughby City Council worked with a student from the University of Western Sydney, looking at the movement of foxes through built-up areas, and this information will be used to develop more comprehensive methods of controlling them. This will help refine Willoughby Council's continuing bi-annual fox-baiting program.

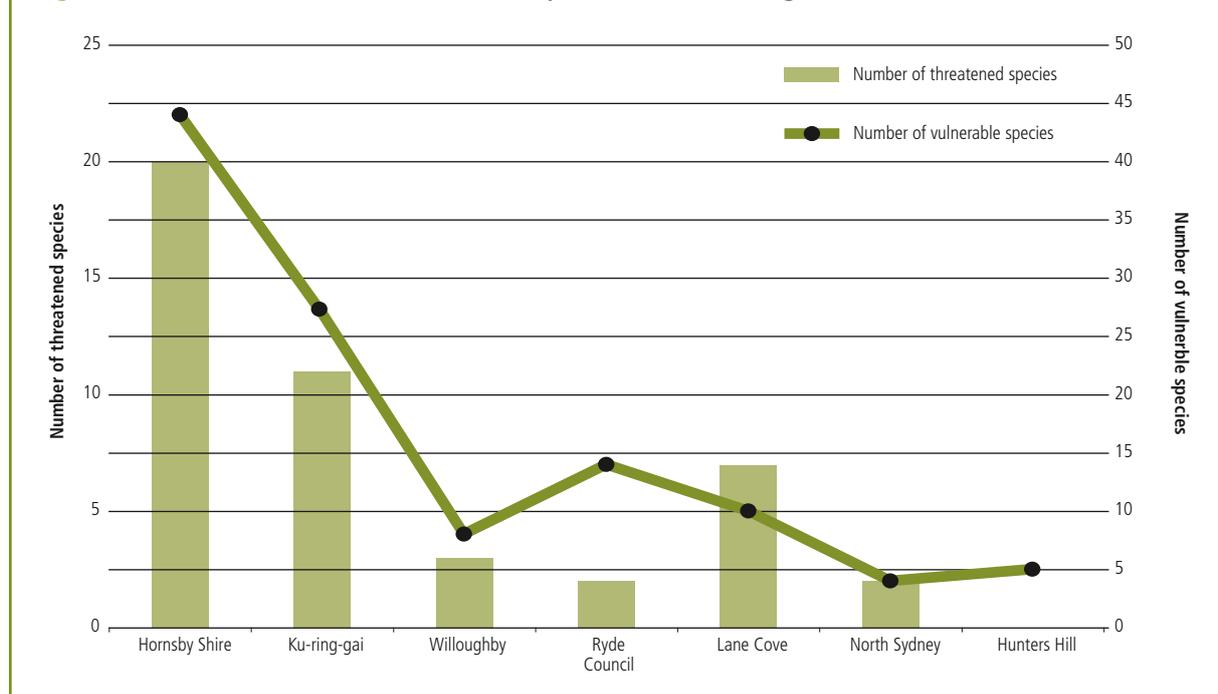
Hunter's Hill Council has an ongoing program of fox and rabbit shooting in five major reserves. The success of shooting is reflected in the fact that rabbit numbers have fallen sharply and fox sightings have become rare. Continuation will hopefully result in the return of marsupials, such as bandicoots and wallabies, to Hunters Hill.

North Sydney Council, a member of UFAAG (urban feral animal action group), undertakes in fox baiting (with two kills in this reporting period) and works with residents to control domestic animals under the Companion Animals Act. All of the council's bush-regeneration contract teams participate in weed eradication.

NATIVE FLORA AND FAUNA

The northern Sydney region is home to a wide diversity of native flora and fauna, much of it under pressure because of encroaching human development and changes to habitat. In the region's north, large areas of bushland are protected by National Park status, and although there are ongoing management issues, the long-term prognosis for flora and fauna is reasonably optimistic. In more populated and developed areas to the south, the pressures become more intense, with some pockets of bushland struggling to remain viable ecosystems, and native fauna rapidly losing vital habitat through environmental changes.

Figure 26: Number of Threatened and Vulnerable Species in the NSROC Region (Noonan 2005)



The North Sydney Continuing Bird Survey

The continuing bird survey provides ongoing monitoring of avian life in the North Sydney area. A total of 136 bird species has been historically recorded in North Sydney (not including aviary escapees), of which 128 are native species and eight are introduced. Six threatened species have been recorded (little penguin, square-tailed kite, superb fruit-dove, glossy black cockatoo, swift parrot and powerful owl), but only two (little penguin and powerful owl) have been recorded more than once. Nine other species are listed on international migratory bird agreements (great egret, white-bellied sea eagle, common noddie, common tern, fork-tailed swift, white-throated needle-tail, black-faced monarch, spectacled monarch and rufous fantail).

The bird fauna of North Sydney has changed dramatically since 1970. There has been a general decline of small bush birds (fairy-wrens, thornbills, gerygones, pardalotes, honeyeaters, robins, whistlers, flycatchers, fantails and silvereyes), and an increasing abundance of larger birds better adapted to the urban environment, such as the crested pigeon, sulphur-crested cockatoo, galah, rainbow lorikeet, noisy myna and the introduced common myna. Other changes have also occurred. The channel-billed cuckoo, absent in the 1970s, is now a regular spring-summer migrant. And in the last few years, the powerful owl and Australian brush turkey have appeared and are now seemingly resident, even though both are large birds dependent on remnant bushland for survival in urban areas.



A total of 55 bird species (50 native and 5 introduced) was recorded during the field survey. The 10 most common species were the noisy miner, rainbow lorikeet, pied currawong, Australian magpie, grey butcherbird, laughing kookaburra, silver gull, white-browed scrub wren, Australian raven and the introduced common myna. The only bushland-dependent species on this list is the white-browed scrub wren, which was surprisingly widespread, being recorded in 11 of the 13 survey areas. It is the only small bush bird that has remained common in the area. The next most common bush bird was the larger eastern whipbird, which was recorded in four survey areas. No other bushland-dependent species was recorded from more than two reserves. A noteworthy feature of the survey results was the number of tawny frogmouth records. This species is common in North Sydney and appears to have adapted well to the local urban conditions.

The Pressure on Native Flora and Fauna

Threats to native fauna diversity in the NSROC region include habitat modification and destruction, feral animals and free-ranging domestic pets. Several threatening processes have been identified and listed under the *Threatened Species Conservation Act 1995*. Factors including bush rock removal, habitat modification and removal, modification of watercourses, predation by foxes and feral cats and inappropriate fire regimes have all been listed as threatening processes that may lead to the decline or extinction of various native flora and fauna species.

Certain species of birds now dominate urban bushland areas at the expense of others because of habitat modification. For example, currawongs, sulphur-crested cockatoos and noisy myna populations have increased in numbers since European settlement while other species such as black cockatoos, thornbills and spinebills have declined.

Habitat fragmentation prevents movement of animals from one reserve to another. This decreases their ability to survive if the area they live in is destroyed by fire, storms or by clearing. Reducing the genetic diversity of animals in each area can lead to a number of problems including an increased susceptibility to disease. Large areas of national parks border Ku-ring-gai, but the area between these parks is largely residential and divided by busy roads. Habitat linkages are therefore not well defined, and bushland areas have become more isolated.

The State of Native Flora and Fauna in the Region

The bushland areas of the NSROC region are home to a rich diversity of native plants and animals. For example, **Hornsby Shire** has more than 1000 native plant species and 338 native vertebrate animal species, and **Ku-ring-gai** has recorded more than 800 native plant species, 170 fungi, 360 vertebrate animals, and more than 170 insect and invertebrate species. Through fauna surveying Willoughby City Council has identified 144 bird species, seven native frog species, 13 native mammal species and 22 native reptile species.

Since European settlement, about 90 per cent of the bushland in **Lane Cove Council** has been developed. This has resulted in an unknown number of local native plant and animal extinctions. This means careful management of our bushland areas is essential to ensure the ongoing survival of remaining locally indigenous plant and animal species.

Vegetation Communities in the NSROC region include:

- coastal saltmarsh community
- Blue gum high forest
- Sydney sandstone gully forest
- Sydney sandstone ridgetop woodland
- Coastal sandstone heath
- Coastal swamp forest

See Appendix for list of all threatened Flora and Fauna in NSROC region.

CASE STUDY

Ryde Biodiversity Surveying Program

The **City of Ryde** is completing comprehensive flora and fauna surveys of most of its significant local bushland reserves, to complement surveys completed in 2006 of the Field of Mars wildlife refuge, Darvall Park and Brush Farm Park, including the adjacent Lambert Park (totalling about 72 hectares), and in 2007 of public bushland in the Terrys Creek, Kittys Creek, and upper Buffalo Creek catchments, and of Memorial Park (53 hectares in total).

The council engaged biosphere environmental consultants to conduct these systematic surveys over the autumn and spring months, and which are designed to discover and map what native and exotic flora and fauna species exist in each bushland area – including plants, mammals, birds, reptiles, frogs, fish and invertebrates (molluscs, insects, spiders). The types of vegetation communities are determined through floral investigations of scientific quadrates, according to DECC methodology.

The surveys are being used to inform the council LEP process and DECC's Sydney metropolitan regional biodiversity mapping initiative, and are helping to determine areas requiring conservation or improvement, in particular relating to threatened species and communities. Opportunities to link to or create new vegetation and wildlife corridors using the findings from the surveys are also being identified, and consideration is being given to the designing and



implementing of key “bio-corridors” to reconnect natural areas of the Lane Cove and Parramatta River systems

See the Ryde website www.ryde.nsw.gov.au to find out more about the program and to view various surveying reports produced as part of the program.

Conserving our Native Flora and Fauna

Councils continue to provide their residents with information about local flora and fauna, and steps that can be taken to protect them. Councils have been particularly active in educating residents of the conservation value of blue gum high forest, especially those living near remnant areas.

Councils run community nurseries, specialising in local indigenous plants propagated by staff using local seeds and cuttings. These nurseries supply plants for councils' planting and re-vegetation needs. **Lane Cove Council's** community plant nursery continues to grow, providing the parks, gardens and the bushland of the LGA with healthy, locally grown plant stock. The use of plants grown from remnant seed helps protect core bushland areas, strengthening habitat and vegetation corridors and maintains biodiversity. Community plant nurseries play an integral role in boosting local area conservation awareness. They also provide another way for local communities to become involved in their local environments.

The NSROC councils are involved in a number of other activities designed to help conserve native flora and fauna including:

- signposting wildlife protection areas, and developing a wildlife protection program which includes feral animal control and domestic pet awareness and education
- developing and undertaking the urban habitats (gardens for wildlife) program in major biodiversity areas
- continuing native plant give-aways at community nurseries to encourage residents to plant local native species, thus improving the quality and amount of habitat available to native birds and animals
- working with bushcare volunteers and groups, and ensuring all volunteers are trained to work safely and effectively in achieving the plans' environmental aims
- preserving and enhancing biodiversity on private property in rural areas
- promoting the biodiversity conservation strategy and action plan
- continuing education and raising community awareness about bushland and biodiversity, and providing training for council staff in working in and around bushland
- continuing joint management initiatives such as green web to address habitat, species and corridor issues;
- developing and implementing management plans for all council-managed natural areas
- growing native flora in community nurseries and distributing these to residents to be used in the local area

Council activities have focussed on creating habitat corridors between bushland reserves to improve the conservation potential of reserves, removing weeds, controlling urban runoff and establishing an appropriate fire regime. Wildlife habitat restoration and feral animal control activities have contributed to the return of several native animals, these include:

- Australian brush turkey
- Lewin's rail
- buff-banded rail
- long-nosed bandicoot

Hornsby Council is committed to protecting and improving its local natural environment through its biodiversity strategy, on-ground bush regeneration work and a large volunteer bushcare program involving 820 volunteers. The council also provides free native plants to residents twice a year, and is working to encourage local nurseries to provide local native stock. The bushland and biodiversity team run the gardens for wildlife workshop series which educates residents on enhancing biodiversity – such as building frog ponds, creating native gardens and identifying bird species.

Ku-ring-gai Council started two mapping projects this year. The first was mapping the exact location and noting the condition of known threatened flora on public land and the second mapping the extent of blue gum high, Sydney turpentine ironbark and Duffy Forest vegetation communities. The second, involving the mapping of three vegetation communities across public and private land, started in January and builds on the work with two major catchment authorities, the Sydney Metropolitan and Hawkesbury Nepean, DECC and the Botanic Gardens.

Hunters Hill Council's foreshore and estuarine vegetation has been largely mapped as having high biodiversity significance in the 2008 Sydney Harbour foreshore and estuarine vegetation mapping- assessment, planning and management project. The LGA contains 41 areas of coastal saltmarsh, an endangered ecological community. The saltmarsh is located in various bushland reserves along the Lane Cove and Parramatta Rivers. The council has received funding to employ contractors to remove weeds in and around the saltmarsh communities, and this work will help protect existing vegetation and allow it to expand into areas previously choked by weeds.

CASE STUDY

Ku-ring-gai Council: Mapping threatened species

Ku-ring-gai Council started two mapping projects this year. The first was mapping the exact location and noting the condition of know threatened flora on public land and the second mapping the extent of blue gum high, Sydney turpentine ironbark and Duffy Forest vegetation communities.



The species-mapping project is an initiative arising from the environmental levy, with an aim to better understand the natural assets within the LGA, particularly those plants species listed by legislation as vulnerable or endangered. The data will be used by operational and planning staff to improve management, particularly in bushland areas (where most are found) and will enable the council and others to track their condition and response to environmental variables such as wildfire, climate change and urban pressures over time. This data will also be provided to DECC to improve its NSW wildlife atlas.

involves the use of 2005 aerial photography and aerial photography interpolation software to identify areas of canopy trees. LiDAR (Light Detection and Ranging) data is then used to refine the mapping through manual aerial photographic interpretation. Field validation is conducted with onsite recording of 16 variables – including list of major canopy, mid-storey and ground-storey species, recruitment of new native vegetation and soil disturbance and condition. This mapping will be used to undertake a conservation significance assessment necessary for a local environment study being developed for the town centres and comprehensive LEPs, and will later be used to help develop control and planning and works on public land.

Mapping of the three vegetation communities across public and private land began in January and builds on the work with two major catchment authorities, the Sydney Metropolitan and Hawkesbury Nepean, DECC, and the Botanic Gardens. The mapping

Willoughby City Council has set up a fauna database compatible with the DECC wildlife atlas. Staff, community members and other agencies can access and contribute to this database. The council held a workshop with the Northbridge Men’s Shed to produce nest boxes designed for crimson rosellas and sugar gliders. Thirteen participants produced about 20 nest boxes on the day, and the shed has gone on to produce more boxes for residents.

North Sydney Council’s native haven program has been operating since 1998 and boasts a number of successfully established native gardens, creating a mosaic of native habitat that may eventually become habitat corridors. This program offers free help to residents wishing to use indigenous plants in their garden. North Sydney, while densely populated, is still home to many native animals. So far, 67 private residents, TAFE Crows Nest, St Marys Primary School, Cammeray Public School, Neutral Bay fire station, the council chambers car park and St Josephs Church have developed native gardens.

Figure 27: The contribution of Bushcare volunteers in the NSROC region, 2007

Council	Volunteer numbers	Volunteer hours	Value of hours (in dollars @ \$25 per hour)
North Sydney	145	3,000	75,000
Lane Cove	231	3,470	86,750
Hunters Hill	85	1,490	37,250
Ryde	678	4,196	104,900
Ku-ring-gai	900	12,000	300,000
Hornsby Shire	1,108	7,082	177,050
Willoughby	300	4,630	115,750
NSROC	3,447	35,868	896,700

4

Water

Water is one of the most important natural resources for humans and our environments. However, the pattern of human demands on water resources does not necessarily reflect the pattern of flow through aquatic environments. The same activities that place demands on water quantity may also put pressure on water quality, and this is becoming increasingly apparent during a period of continuing drought, climate change and water restrictions.

Significant efforts have been made recently at both state and regional levels to improve water quality, including state government reform packages, legislative reforms through the Protection of Environment Operations Act, and changes to water licensing provisions, new monitoring processes, and a general trend towards holistic catchment management processes. (NSW SoE 2000)

An outstanding feature of the northern Sydney region is its extensive interface with water bodies that are important for all of Sydney, but particularly Sydney Harbour, Parramatta River, Lane Cove River, Middle Harbour and estuarine reaches of the Hawkesbury River. These are not only iconic for Sydney residents, but have contemporary and historical meaning for all Australians. The seven NSROC Councils share responsibility for the management of river, estuarine or coastal stretches of one or more of these prominent water bodies with up to 20 other agencies or groups.



WATER QUALITY

Clean water supports a healthy ecosystem and thereby our own health. However, the reverse is also true; a healthy ecosystem generates and maintains a clean water supply, hence benefiting our health. Measuring and protecting water quality remains a significant challenge for northern Sydney councils. This is because the resource demands in procuring good water quality data sets and the many variables which can affect water quality which are beyond the control of individual councils.

Nonetheless, many NSROC councils have started monitoring macro-invertebrate populations in local streams and waterways, and interpreting data through the SIGNAL (stream invertebrate grade number-average level) and AusRivAS Index systems. The councils also work with a number of organisations, such as the Sydney Harbour Foreshore Authority and the Upper Parramatta River Catchment Trust to manage water-quality issues in their localities. Each council is conscious of the need to ensure future land-use planning recognises the need to protect the quality of their waters and the ecology they support.

Impacts on Water Quality

The most significant pressure on water quality is urban development. Urban development results in the loss of vegetation, pollution, altered flow rates, sedimentation and the introduction of exotic species – which all lead to reduced ecosystem function and poor water quality.

An additional pressure is the strengthening of the drought across NSW. In simple terms, less rain falling in the catchment means less water to flush and dilute surrounding catchment systems, such as rivers and creeks, of any build-up of pollutants. When rain does fall, the amount of run-off that is generated is closely linked to the area of impermeable surfaces compared with the area of permeable surfaces within the catchment. Pollutants that are transported in urban run-off often dramatically alter local creek and river water quality.

A final pressure is caused by sewerage overflows which have the potential to result in human gastrointestinal infections, degradation of the ecology of receiving waters, and damage to native vegetation exposed to contamination.

Water Quality in the Region

Water quality throughout the northern Sydney region varies greatly, depending on the proximity to development, timing of measurement and the degree of contamination because of sewerage overflows and land uses within the catchment. Overall the data indicates that regional creeks and streams where water sampling takes place are under stress associated with their urban context and the current dry conditions.

Some residential areas in Hornsby Shire, Hunter’s Hill, City of Ryde and Willoughby City LGAs remain unsewered, and rely on septic tanks, other on-site management systems or pump-out facilities. By modern environment-protection and public health standards, this is undesirable for any urban environment – especially so in a major capital city.

Hornsby Shire Council has 4077 on-site residential systems in remote rural and river settlement locations where town sewerage services are not practical or affordable. In terms of potential risk to public health 57 per cent have a low-risk rating, 36 per cent have a medium-risk rating; and 7 per cent have a high-risk rating. While this suggests there is minimal cause for concern with the existing arrangements, it isn’t difficult to envisage risks increasing if the number of properties in these areas increased significantly. (*Noonan 2005*)



Figure 28: Interpreting the Signal 2 Index

SIGNAL 2 Score	Habitat quality
Greater than 6	Healthy habitat
Between 5 and 6	Mild pollution
Between 4 and 5	Moderate pollution
Less than 4	Severe pollution

Goooderum J. and Tsyrlin E. 2002 The Waterbug Book, A Guide to the Freshwater Macro-invertebrates of Temperate Australia. CSIRO Publishing, Collingwood Vic. 21

The figure below provides SIGNAL 2 scores for creeks in the NSROC region. The SIGNAL 2 Index provides a crude measure of water quality based on macro-invertebrate tolerance. High SIGNAL 2 scores indicate low levels of nutrients, salinity and turbidity, with high levels of dissolved oxygen. Low SIGNAL 2 scores generally denote poor water quality and disturbance.

Maintaining Water Quality

Councils have responded to the pressures on water quality in a number of ways, including:

- land-use planning requirements which need special consideration of development in close proximity to waterways
- regulatory enforcement in response to incidents of water and environmental pollution
- the development of specific waterway management plans

Most NSROC councils have also been conducting regular water-quality inspections. Macro-invertebrate (insects, crustaceans, and molluscs) sampling is seen as an important indicator of water health. These animals live in water for all or most of their lives, so their survival is closely linked to water quality. In turn, the survival of larger animals like fish depends on macro-invertebrates as a source of food.

CATCHMENT MANAGEMENT

Catchment management continues to play an important role in each council's daily work. The term "catchment" refers to land that is determined by certain topographical features such as a ridge top where any rain is directed into a receiving water body such as a creek or stormwater system. A vital component of effective catchment management is the need to protect the quality of the water in natural systems such as rivers, creeks, estuaries and coastal waters. Poor-quality water reduces the survival of a wide range of aquatic plant and animal species, or of those which live on the land, but depend greatly on local aquatic systems for survival.

There are a significant number of major catchments within the NSROC area, including Middle Harbour, Lane Cove River and Cowan Creek. The management of these can cover a great number of aspects, ranging from noxious aquatic weed eradication, stormwater management and strategic urban planning. A number of these management options have already been detailed in this report.



Figure 29: Water quality results at sites within the NSROC region using Macroinvertebrate Analysis, 2007/08

Catchment	Locality Code	Signal2
North Sydney	Berry's Ck	3.1
	Quarry Creek (Tunks Pk)	2.6
Hunters Hill	Tarban Ck	2.82
	Tarban Ck tributary	2.73
	Tarban Ck tributary	2.73
	Tarban Ck tributary	2.73
Ryde	Buffalo Ck	3.10
	Terrys Ck	3.20
	Archers Ck	3.26
	Porters Ck	2.97
	Shrimptons Ck	2.97
Lane Cove	Gore Creek	3.1
	Stringybark Creek	3.0
Willoughby	Swaines Creek	3.3
	Flat Rock Creek	2.8
	Sailors Bay Creek	2.7
	Scotts Creek	2.8
	Swaines Creek	3.3
	Flat Rock Creek	2.8
Hornsby Shire	Hornsby Creek	No data*
	Smugglers Creek	No data*
	Colah Creek	No data*
	Terry's Creek	No data*
Ku-ring-gai	Ku-ring-gai Creek	3.5
	Lovers Jump Creek	3.5
	Falls Creek	3.4
	Gordon Creek	2.8
	Quarry Creek	3.1
	Cowan Creek (at Bannockburn Oval)	3.5
	Avondale Creek	3.1

*No macro-invertebrate analysis was performed by Hornsby Council in 2007/08 as a review into water quality processes is taking place

Pressures on Catchments in the Region

A significant pressure on the NSROC region's catchments is inappropriate management of erosion and sediment control on building sites in the area. Conditions of development consent are imposed in an effort to control or minimise runoff. The soil on a building site is often disturbed by development activities. The disturbed soil, along with other pollutants, is then washed into the stormwater or local creek system with the next rainfall. Polluted stormwater from building sites can cause flooding, weed infestations in downstream bushland areas, toxic algal blooms and a reduction in aquatic species diversity.

More insidious is the progressive sedimentation by fine particles washed down to creeks or the shoreline. Modern environment-protection regimes have had some success in preventing the gross movement of soil from areas of activity such as construction sites. However, concerns remain about the potential effects of longer term accumulation of finer and less visible particles that continue to move across the catchment with heavy rain. Their accumulation in creek beds smothers sensitive benthic inhabitants or reduces the transmission of light that is important for their survival. (Noonan 2005)

Condition of the NSROC Catchments

The national land and water resources audit of 2002 assessed the overall riverine ecosystem health throughout NSW. It based its findings on the macro-invertebrate data collected in the national river health program between 1994 and 1999, as well as other data available on catchment and riverine habitat condition, hydrological disturbance and water quality. The Audit's main findings were:

- NSW has the poorest aquatic biota condition of any Australian state or territory, with macro-invertebrate communities impaired along 50 per cent of the length of rivers assessed
- the environmental condition of 97 per cent of the assessed river length in NSW had been modified, resulting in catchment disturbance from nutrients (especially total phosphorus) and suspended sediments in 97 per cent, altered hydrologic regimes in 87 per cent, and modified aquatic habitat in 70 per cent

Of particular relevance to NSROC was that the most severely impaired sites were close to urban areas including the Parramatta and Lane Cove Rivers.

An analysis of faecal coliform pollution on the waterways around the NSROC region shows a significantly decreased level of compliance compared to last years data. This is likely because of much higher rainfall (see below) and highlights ongoing health concerns relating to the capacity and performance of the region's sewerage and stormwater systems. Harbour sites in the lower Parramatta River and in Darling Harbour remain problematic because of historic and current industrial activity.

Figure 30: Compliance by per cent of pollution at NSROC Beaches, 2007/08 (Beachwatch 2008)

Season	Faecal Coliform Seasonal Compliance	Enterococci Seasonal Compliance	Site Name	Area / Waterway
Summer	74	61	Tambourine Bay	Lower Lane Cove River
Winter	82	73	Tambourine Bay	Lower Lane Cove River
Summer	97	77	Woodford Bay	Lower Lane Cove River
Winter	82	82	Woodford Bay	Lower Lane Cove River
Summer	77	71	Woolwich Baths	Lower Lane Cove River
Winter	77	73	Woolwich Baths	Lower Lane Cove River
Summer	87	84	Greenwich Baths	Lower Parramatta River
Winter	82	82	Greenwich Baths	Lower Parramatta River
Summer	81	74	Northbridge Baths	Middle Harbour
Winter	77	73	Northbridge Baths	Middle Harbour
Summer	84	68	Hayes Street Beach	Port Jackson
Winter	84	68	Hayes Street Beach	Port Jackson

Note: Winter season is May 2007 to September 2007, Summer season is October 2007 to April 2008. % Compliance is percentage compliance with Beachwatch swimming water quality guidelines.

Improving Catchment Management

In 2006, the NSROC councils agreed to form the NSROC waterways group to provide a more holistic structure to manage the region's waterways. The group will comprise council staff from the seven councils and will receive administrative support from Sydney Catchment Management Authority. The terms of reference and membership of the group are still to be formalised.

The northern Sydney councils have also developed a number of catchment-management plans to deal with catchments under their control, in consultation with their communities. Actions are developed as part of these plans and form an on-going basis for the holistic management of these important environmental assets.

A number of NSROC councils participate in the international council for local environmental initiatives (ICLEI) water campaign which aims to provide strategic directions for improved water sustainability. The plan identifies actions that will improve catchment water quality as well as reduce the effects of urban runoff.

Ku-ring-gai Council runs a number of catchment-management programs throughout its LGA. One involves the installation of water-sensitive urban design devices to improve the quality of stormwater before it's discharged into natural areas. Projects undertaken this year include the installation of bio-filtration rain gardens, bio-filtration swales and sediment-detention basins to reduce the impact of water-borne pollutants such as sediments, nutrients, metals and hydrocarbons generated by stormwater flow over streets that adversely affect receiving waters and overall waterway health.

The successful trial of these devices last year has allowed this type of catchment management to be integrated into the council's management plan and integrated into its existing suite of programs. As well as this, remediation of unstable stream channels and vegetation of important riparian zones has also been undertaken as part of Ku-ring-gai's catchment-management program.

Willoughby City Council has continued implementing the recommendations of the CMA catchment action plan which has included a number of riparian restoration works in the Middle Harbour and Lane Cove catchments. The council has also undertaken community education through its street-to-creeks program to lift community awareness and understanding of the pressures on its waterways, and how the community can help improve the condition of its catchments.

City of Ryde has recently rehabilitated Archer Creek at Lambert Park, where a highly degraded tributary of Archer Creek draining through the park has been restored, improving the local environment and providing public access for passive recreation and bushcare activities. Major environmental outcomes include the reduction in sediment loads discharging to Parramatta River, improvement in water quality, and the re-establishment of a creek riparian zone with native species. The removal of the heavy weed infestation and revegetation will help re-establish native species to improve the area's amenity as well as provide a significant foundation for further, staged bushcare activities.

Lane Cove Council undertook a major project in its largest sub-catchment to improve water quality of the Stringybark Creek and Lane Cove River. Jointly funded by the council and the Sydney Metropolitan Catchment Authority, the project involved rock armouring a section of creek bank to reduce stream erosion at the stormwater outlet, along with the construction of a gross pollutant trap. The success of this project has led to the planning for a second trap in the next sub-catchment.

Ryde, Hunter's Hill, Lane Cove and Willoughby Councils have started a study on the public health needs of users of the Lane Cove River estuary. By identifying community needs, the study will identify the need for additional public amenities and facilities along the estuary and to beautify estuarine foreshores.

The collection of performance data by **Hornsby Council** over the past financial year has allowed it to examine the indicative maintenance costs and gross pollutant (sediment, litter and organic matter) removal from the council's 370-plus water-quality improvement devices. The results show that 1236 cubic metres of sediment, litter and organic matter was removed from the LGA's drainage system and waterways over an average 13 separate cleaning events. The principal objective of installing stormwater treatment measures is to improve the quality of stormwater by removing pollutants and, in some instances, retaining stormwater flows. In 2007-08, the council completed 16 catchment remediation capital works at a cost of \$957,000. These involved the construction and/or installation of 11 sediment basins, four end-of-pipe gross pollutant traps, eight stream remediation projects, one bioremediation basin and six stormwater gardens.

Hunters Hill Council and **Ryde City Council** are contributing members of the Parramatta River catchment group, formed to lead efforts to improve the river's condition and ecological function, as well as those of its tributaries

CITY OF RYDE DRIVES: Catchments Connections – partnerships between councils and communities

Catchment connections is a three-year grant-funded project covering the Terrys, Mars, Shrimptons and Buffalo Creek catchments – all tributaries of the Lane Cove River. The partnership project is jointly funded by the NSW Environmental Trust's urban sustainability grants program and three local councils: Ryde, Hornsby and Hunter's Hill, with City of Ryde as the lead council.

The project's primary objective is to reconnect the community with its local catchment. Through project activities it is envisaged that a community commitment on the part of project participants will be fostered to restore and maintain catchment environmental health through individual behaviour. The project will enable councils to develop partnerships between LGAs and their communities as well as build on past and current initiatives while continuing to engage with their communities through previous partnerships and educational programs.

Project activities include investigating water-sensitive urban design options for Macquarie Park and the Eastwood town centre, bush regeneration and restoration activities, the training of volunteers and the forming of new volunteer bushcare groups in targeted catchments, undertaking bush neighbour visits and catchment workshops for the local

community, and preparing education for sustainability (Efs) resources.

An educational artwork mural painted by students from four local schools (Epping Heights, Riverside Girls High, Ermington Public and Ryde Public) was installed along the fence at Eastwood Canal at the top of the Terrys Creek catchment as part of the catchment connections project in 2008.

The mural depicts the creek flowing through the urban environment of Eastwood, and shows different types of stormwater pollution and solutions for addressing it. It then shows the creek flowing through a healthy, natural environment complete with native plants and animals.



and catchment lands. Both councils have partnered with nine other councils and 10 agency groups across the Parramatta catchment to address natural resource management issues such as biodiversity corridors, weed and pest management, water quality and stormwater infrastructure.

North Sydney Council has participated in and implemented water-saving initiatives including ICLEI's Water Campaign, the Every Drop Counts program and NSC's Water Savings Action Plan. Outputs included rainwater tanks and other water saving devices installed at Crows Nest community centre and Cammeray Park amenities block. The council participated in the Lower North Shore consortium of councils' multi-unit dwelling illegal dumping campaign, which reduced the incidence of illegal dumping by raising residents' awareness and offering alternative solutions. The council developed and released a sustainability education kit for primary schools, with activities on waste management and water quality, and also ran gross pollutant trap excursions where students observed litter traps being cleaned. The council also worked with building managers and tenants in the North Sydney CBD to install 30 cigarette butt receptacles (butt bins) outside offices.

STORMWATER MANAGEMENT

In urban areas, stormwater runoff typically contains litter, bacteria, pesticides, metals, sediments, oils and grease. Some of these are sources of excess nutrients. Some come from road surfaces, small industrial and commercial premises, parks, gardens and households. Urban stormwater contaminated with sewerage overflows have also been implicated as a significant source of bacterial contamination of beaches and recreational waterways after rain, and may contain heavy metals, especially lead. (*Department of Environment and Conservation, 2000*)

An integrated approach to urban stormwater management is essential for supporting the conservation of our land resources and biodiversity. It is one way we can protect the quality of life for all urban inhabitants and make a significant contribution toward sustainability.

Stormwater Issues

Development in the NSROC region is resulting in a rise of impervious surfaces because of greater development sizes and increased hard landscaping such as footpaths and driveways. Rain that used to fall on open ground and soak into the soil is now caught on roofs and driveways, and redirected into the stormwater systems. Another consequence of this increase in impervious surfaces is a subsequent rise in pollutant levels in receiving water-bodies. Although there are measures to reduce effects of this higher urban run-off, both in terms of the amount of water and pollutants, it remains a challenge to ensure no further adverse effects on the stormwater system occurs, especially on natural waterways.

The State of Stormwater in the Region

The NSROC region is characterised by steep inclines that lead directly to natural water bodies at many locations. The topography of areas such as North Sydney, Lane Cove, Willoughby and Hornsby Shire provides for spectacular scenery, but also facilitates rapid flows during heavy rainfall. Accordingly, there are sound reasons to be concerned that development could stress surrounding receiving waters. Not only will demands on the stormwater infrastructure increase proportionally to the scale of development, but the intensification will most likely be at the expense of pockets of existing vegetation cover and its potential aid in retarding the movement of soil at the most critical period of soil disturbance. (*Noonan 2005*)

DECC reported that catchment areas have been greatly modified, with creek systems being extensively channelled or hard-edged with concrete. Wetlands have been destroyed or degraded, and natural remnants of vegetation are often choked by weeds and rubbish. They also found some streams carry poor-quality stormwater which further impacts on the health of wetlands. The department's concerns are reflected in a range of specific circumstances throughout the NSROC region. For example:

- **Hunter's Hill, Lane Cove and North Sydney Councils** work with the University of Technology Sydney to monitor stream health. Monitoring is conducted in autumn and spring each year. Monitoring of macro-invertebrate populations in these LGAs indicate poor water quality in urban streams adjacent to the Lane Cove River.
- Macro-invertebrate and chemical testing at five sites across the **Ryde LGA** was conducted in spring and autumn months this year. Low dissolved oxygen and high nutrient levels continued to show up consistently across all sites. Although reasons for these low levels still need to be confirmed, the low flows being experienced in south-east NSW during the drought is likely to be a contributing factor. The diversity of macro-invertebrate results also reflected findings that would be expected for typically affected urban streams. However more data is required before informed conclusions and management judgements can be made. The community water quality monitoring steering committee which is guiding council programs will next year be looking at identifying and prioritising improvement strategies. But early indications are that the impaired macro-invertebrate communities in each of the monitoring sites may be due to stormwater connectivity with regular delivery of pollutants and altered geomorphic conditions due to this connectivity. In the last three years, all sites except the Shrimptons Creek system have been relatively consistent, with Shrimptons Creek showing slight signs of improvement in AUSRIVAS results.
- **Ku-ring-gai Council** is made up of Cowan, Lane Cove and Middle harbour catchments with urban development located along a ridge at the top of the catchments. The urban areas are surrounded by three national parks downstream which are directly impacted by any stormwater leaving the urban areas. Because of the distinct character of its LGA, the council has integrated controls to address both stormwater quality and quantity into all levels of planning and management to mitigate adverse impacts on the surrounding catchments and bushland.
- **Willoughby** has experienced unprecedented growth in medium- to high-density development in the past 20 years. This is also placing an extraordinary strain on the council's ageing infrastructure, causing a rise in localised flooding and severe degradation of local streams and estuaries. The council is carrying out mitigation projects and implementing strategies to improve water quality, restore riparian habitat, rehabilitate both natural and built drainage systems and protect properties from flooding. Those projects and strategies include:

- continuing to undertake major rock armouring and revegetation works in the lower reaches of all Willoughby's local streams to prevent bank erosion, restore habitat and improve water quality
- continuing to prevent soil erosion in local bushland by installing rock lined channels or, where a property discharges into bushland, request the owner install a rock lined channel
- encouraging developers to install large rainwater tanks in all development types to reduce the total volume of stormwater discharge into the drainage system or bushland
- undertaking a systematic program of cleaning and repair of all existing drainage infrastructure. In conjunction with this work, hydraulic assessment and upgrading of drainage infrastructure to improve the carrying capacity and mitigate nuisance flooding is being undertaken.
- installing stormwater harvesting systems to reduce total stormwater volumes in local streams as well as to reduce the council's potable water demand for sports field irrigation.

In **Hornsby Shire**, creeks located in areas with the least disturbance, or furthest downstream from land developments, usually had water quality which satisfied the current environmental water-quality guidelines. The two reference creeks, located within undeveloped catchments within national parks, are classified as healthy according to guideline criteria. These sites provide a good baseline against which to compare other creeks in the shire. Overall, the trends and ranges of contaminant levels at most creek sites were similar to the last few years. Creeks close downstream to urban and rural areas only conform to water-quality guideline values part of the time; they suffer from occasional moderate levels of contaminants in wet and/or dry times, in particular elevated nutrient nitrogen and faecal bacteria. The highest concentrations of ammonia and faecal bacteria contamination were present in sampling sites close to downstream industrial areas, particularly the Thornleigh industrial area draining into Larool Creek.

Responding to Stormwater Issues

Each council within the NSROC region has acknowledged future problems that could be associated with the existing stormwater system. However, none are confident that their future capacity to raise revenue would provide them with the funding needed to overcome the on-going pressure on the existing stormwater system to handle larger flows resulting from population growth. Neither property rates nor developer levies are likely to be adequate to retro-engineer the vast stormwater drainage networks that each owns, even taking into account the \$75 million the NSW government has allocated across the state to improve management and planning of the drainage systems. (*Noonan 2005*)

CASE STUDY

Lane Cove Council rainwater tanks

Lane Cove Council has taken significant steps to reduce potable water use in both council and residential buildings. The council has installed rainwater tanks at three of the local childcare facilities – Kindy Cove, Lane Cove Occasional Childcare, Birrahlee kindergarten – with a total capacity of 28,830 litres to be used for water play, irrigation, the washing machine and toilet flushing. A 21,270-litre rainwater tank was installed at the council's administration centre to provide water for flushing toilets on the ground floor and urinals on the lower floor. This tank supplements the four 2500-litre tanks already installed for irrigating the centre's landscaping. Additional tanks were also installed at the girl guides hall, with two 24,500 litre tanks about to be installed at Tantallon oval for irrigation. Additional measures are planned for the upcoming year to address key targets in the council's water savings action plan.

To reduce potable water consumption in residential premises Lane Cove Council launched its rainwater

tank rebate program in 2008. Rebates offered are in addition to those offered by Sydney Water/ Department of Environment and Climate Change. Residents can also take out an interest-free one-year loan with Sydney Credit Union for up to \$3000. The program was launched with an information seminar featuring the Master Plumbers' Association of NSW and representatives from a number of suppliers.





The NSROC councils are investing in a number of strategies to deal with stormwater issues, including:

- replacing infrastructure
- installing gross pollutant traps
- education
- planning
- installing rainwater tanks to reduce flows during rain events

Education is considered central to the improvement of stormwater management and the prevention of water pollution, and is being delivered to council staff and the community.

Lane Cove Council is undertaking a survey and condition audit of its stormwater system. This survey is due to be completed at the end of 2008/2009 financial year. The information collected will be incorporated into its GIS and assets management systems enabling the council to gain a better understanding of its current position and develop future asset management plans.

Hunters Hill Council conducted a stormwater education program in early 2007 to inform residents of their responsibility to help manage the quality of stormwater entering natural environments. As well as general education, the council partnered with schools to develop slogans for drain stencils to be sprayed on stormwater drains in the municipality. The council also received grant funding in partnership with members of the Parramatta River catchment group to implement projects aimed at improving the quality of water entering Parramatta River. This grant will be used to capture, treat and reuse harvested stormwater from the car park at Clarkes Point sailing club.

Water-quality monitoring by **Hornsby Council** supported its catchments remediation capital works program and some projects developed under its total water-cycle management strategy. In this reporting year, water testing showed that constructed wetlands at Clarinda Rd, Hornsby and Cherrybrook Lakes reduced concentrations of nutrients (40 per cent to 60 per cent) and faecal coliform bacteria (60 per cent to 70 per cent) in urban stormwater runoff. Monitoring showed that, after treatment of back-flush water at the council's aquatic centres, the treated water was of excellent quality for reuse. Bio-filter and wetland treatment facilities at the rehabilitated Foxglove landfill site successfully reduced nutrients concentrations in collected tip leachate, enabling the treated waters to be better used for irrigation. Stormwater harvesting facilities near sports fields and at the council's nursery were providing valuable irrigation water to save mains water supplies; water-quality monitoring showed the collected waters were fit for purpose.



The North Sydney Council stormwater reuse project harvests, filters and treats stormwater from an urban catchment for irrigation of high profile sporting and recreational facilities, including North Sydney oval and Cammeray golf course. The scheme contributes significantly to the conservation of Sydney’s water supply, and is expected to save 90 million litres of drinking water each year while improving the local environment. This project controls stormwater runoff to reduce erosion, pollution, flooding and provides opportunities for resource conservation, while building the region’s capacity to positively respond to the effects of drought and future impacts of climate change. North Sydney Council continues to build and maintain a network of 25 gross pollutant traps throughout the catchment, significantly reducing the amount of litter entering the harbour. The council has also acquired new smaller street sweepers that allow for mechanical sweeping of footpaths and plazas in business areas, resulting in more litter being removed from the stormwater system.

Ryde Council is focused on reducing stormwater pollution and increasing water quality through a variety of measures and projects. A recent project is the construction of an offline gross pollutant trap along a trunk drainage system that discharges through Meadowbank Park into Parramatta River. As well as significantly reducing the amount of dissolved and gross pollutants entering the river, the device is planned to be coupled with additional secondary treatment and storage infrastructure as part of the Meadowbank Park stormwater harvesting and reuse system. The council is continuing to carry out a number of mitigation projects and implementing strategies to improve water quality, restore riparian habitat, rehabilitate both natural and built drainage systems and protect properties from flooding. This has been necessary because of an unprecedented growth in medium- to high-density development in Willoughby over the past 20 years which has placed an extraordinary strain on the council’s ageing infrastructure, local streams and estuaries.

Ku-ring-gai Council has undertaken a significant amount of stormwater rehabilitation works as part of the environmental levy during the reporting period. Creek restoration and rehabilitation works, including the construction of sediment ponds, weed and sediment removal have been undertaken at St Andrews Place, Pymble, St Johns Avenue, Gordon, Bolwarra Avenue, West Pymble, Murrumba Place, Killara, and Dufaur St, Turramurra.

Figure 31: Performance and expenditure relating to Gross Pollutant Traps within the NSROC region, 2007/08

Council	Gross Pollutant Traps (GPTs) per area	Tonnage waste removed from GPTs	Cost of GPT construction (\$)	Cost of GPT maintenance (\$)
North Sydney	25	366	0	67,825
Lane Cove	4	4	0	11,300
Hunters Hill	31	1	0	15,000
Ryde	27	213	250,000	48,076
Ku-ring-gai	131	25	0	13,200
Hornsby Shire	371	1600	957,000	428,000
Willoughby	6	58	0	20,365
NSROC region 2007/08	595	2,267	1,207,000	603,766
NSROC region 2006/07	584	1,926	775,000	496,664

Atmosphere

The Earth's atmosphere consists of nitrogen (78.1 per cent) and oxygen (20.9 per cent), with small amounts of argon (0.9 per cent), carbon dioxide (variable, but around 0.035 per cent), water vapour, and other gases. The atmosphere protects life on earth by absorbing ultraviolet solar radiation and reducing temperature extremes between day and night. About 75 per cent of the atmosphere exists within 11 kilometres of the planetary surface.

The atmosphere regulates the earth's temperature through a phenomenon called the greenhouse effect. However, with an increase in human activity, this effect is being enhanced causing accelerated global warming. This warming can cause severe weather patterns including droughts, floods and severe storms and also climate zone shifts causing polar ice melts and rising sea levels.



GLOBAL WARMING

Globally and nationally, there is a widespread acceptance that climate change is being affected by greenhouse gas emissions, and that this process is set to continue for the near future. Australia has now ratified the Kyoto Treaty on greenhouse gases, and state and local governments, working with their local communities, are working to try and reduce green gas emissions through educational programs and the introduction of energy conservation measures. There is widespread acceptance throughout Australia of the threats posed by climate change globally, and to our country in particular.

Although there are differing opinions on the need to respond to greenhouse issues, many organisations are already participating in programs to reduce their emissions. The NSROC councils have put a high priority on this issue within their overall concerns about the future environment of the region. *(Noonan 2005)*

NSW's per-capita greenhouse emissions are significantly higher than most industrialised countries, but lower than those of some other states. While total NSW greenhouse emissions were less in 2004 than they were in 1990, emissions are increasing and are predicted to rise further, influenced largely by strong growth in the stationary energy sector. Consequently, the trend is deteriorating. In NSW, scientists project a warming of between 0.2 degrees Celsius and 2.1 degrees Celsius over the next 30 years and a general tendency for decreasing annual average rainfall. Although some agricultural or forestry activities may benefit from small rises in temperature and carbon dioxide concentration, most changes in climate are expected to have negative impacts on natural ecosystems, water resources, primary industries, human health and settlements. *(New South Wales State of Environment Report 2006, Department of Environment and Climate Change, December 2006, p 68.)*

Greenhouse Gas Issues

Recently published evidence suggests fossil fuels will continue to dominate as the source of our energy past 2020, and these will be largely coal-based. Energy-production efficiencies are expected from extensive United States and Australian research into clean-coal technologies, and this should produce greenhouse benefits. But the growth of energy consumption patterns in areas such as northern Sydney is likely to be inextricably linked to additional

CASE STUDY

Ku-ring-gai Council: climate change adaptation at a local scale

A cost-benefit assessment of climate change impacts, mitigation and adaptation options is a model needed by decision makers at the local level in the public sector. **Ku-ring-gai Council** has developed a conceptual risk analysis and cost benefit response model which will allow decision makers to better understand the magnitude of climate change impacts and plan phased greenhouse gas mitigation strategies to maximise a reduction in emissions. The model will also examine local-scale options for adaptation in relation to evolving scientific predictions. It will allow decision makers to make informed choices regarding the scale and timing of investment in mitigation and adaptation.

The council is working with researchers at Macquarie University to expand the Ku-ring-gai model into a generic planning model suitable for any local government agency worldwide, and is collaborating with the local community, business, government agencies, council staff and a number of university academics from climate scientists to economists to establish central areas of climate change risk in the

Ku-ring-gai area, and to establish a decision support model to determine:

- an appropriate and affordable level of precaution
- identify which risk would be minimised from early investment
- identify which opportunities would be maximised from early investment
- determine how to collaborate with partners and the community to maximise efficiency and optimise effect from planned responses





CO₂ generation somewhere in the region's energy production or transmission chain.

NSW's comparatively high per-capita emissions result from a high dependence on coal-fired power stations, the energy intensity of our exports (such as coal and steel) and long transport routes combined with a preference for road transport over rail. The Australian National Greenhouse Office predicts emissions from energy generation will continue to grow strongly, and will only partially be offset by reductions in CO₂ emissions from tree planting and reduce land clearing. (*New South Wales State of Environment Report 2006, Department of Environment and Climate Change, December 2006, p 74.*)

Therefore, the fundamental challenge for local government bodies is to help their communities reduce their energy dependency while at the same time identify activities which will offset emissions and ameliorate negative impacts of climate change.

The NSROC's growing population and associated urban consolidation is likely to generate higher greenhouse gas emissions because of:

- increased demand for air-conditioning and for construction of higher buildings with greater direct sun exposure
- increased traffic congestion resulting in less efficient consumption of fossil fuels
- increased ownership of energy-consuming appliances

An important development in this area is the federal government's intention to start a carbon-trading scheme in 2010. This is likely to have an enormous impact on emissions generally, although the real impact on councils and their operations is not yet known.

The introduction of the energy conservation opportunities proposed in schemes like the state government's BASIX code should eventually show a positive impact. The timing of this support will be influenced by the proportional change in the residential dwellings incorporating improved performance features. This will not be as fast in the NSROC region as it will be in new greenfield development areas.

Greenhouse Gas Emissions in the Region

Although all NSROC councils are committed to cutting greenhouse gas emissions, they are only just starting to audit their own facilities against industry standards to determine the amount of greenhouse gases they create. All councils have joined the Cities for Climate Protection (CCP) program and some have started buying "green energy" produced from environmentally friendly sources. While councils also run a number of education programs in this area, their overall impact in reducing greenhouse gas emissions is unknown and difficult to disaggregate from state and federal initiatives.

Figure 32: Greenhouse emissions and reduction through council action in the region for the year 2007/08

Council	Tonnes of CO ₂ created by Council for top three sites	Tonnes of CO ₂ saved through projects for all council assets	Tonnes of CO ₂ saved by council run community projects
North Sydney	2,600	14,452	33,741
Lane Cove	1,340	858	123
Hunters Hill	200	30	N/a
Ryde	781	418	33,775
Ku-ring-gai	1,400	469	272
Hornsby Shire	1,778	2,978	54,688
Willoughby	2,815	414	7,347
Total for NSROC region	15,379	19,619	122,579

Figure 33: NSROC Climate Change Initiatives endorsed by NSROC Board on 10 May 2007

1. DEVELOP REGIONAL POSITION (signed by all Councillors)	Carbon Neutral Events Possibility of Council's offsetting all emissions (with a target at a regional rather than individual council level)
2. NSROC ANNUAL CONFERENCE	Theme could be Climate Change
3. NSROC WORKSHOPS	NSROC could host one of the two Climate Change Workshops already being organised by the LGSA
4. NSROC REGIONAL SUSTAINABILITY PLAN	NSROC Utilise the \$50,000 grant from the Urban Sustainability Program to include regional climate change responses
5. REGIONAL PROMOTION NSROC NEWSLETTER	E-Waste } Green Energy } Use Scorecard Retrofitting } from SoE Report Fridge Buy Back } Letters from Mayors to businesses/residents urging a switch to GreenPower.
6. NSROC REGIONAL SoE	Sub Section to include Climate change
7. LOCAL GOVERNMENT EMISSION SCHEME 'LGETS'	Use of software to track Council and resident emissions
8. DEPARTMENT OF EDUCATION; CATHOLIC EDUCATION, AND PRIVATE SCHOOL EDUCATION	Meet Sustainable Schools Coordinator and assist Schools in region in educating students on climate change. Co-ordinate through Sue Martin LGSA
9. NSROC ENVIRONMENTAL EDUCATION NETWORK	NSROC Approve formation of a Environmental education network Release an environmental education calendar on World Environment Day
10. LOCAL CHAMPION	To lead Climate Change Debate within the region.
11. LOCAL RESIDENT ACTIONS	To be managed by individual Councils but possibly replicated and coordinated on a regional basis.

Figure 34: NSROC carbon emission reduction targets

Council	Date Adopted	Target for Council	Date to be achieved	Target for Community	Date to be achieved
Willoughby	2000	50%	1999 – 2010	30%	1995 – 2015
Ryde	2007	30%	003/04 – 2012	20%	2001 – 2010
Hunter's Hill	2007	20% 50% 100%	2010 2025 2050	10% 30% 60%	2010 2025 2050
Lane Cove	2007	50%	2001 – 2017	50%	2017
North Sydney	2001	50%	1996 – 2010	25%	1996 – 2010
Hornsby	2006 2006	35% 60%	1996 – 2012 1996 – 2050	5% 10%	2010 2050
Ku-ring-gai	2000	20%	1996 – 2010	10%	2011

Responding to Greenhouse Emissions

The northern Sydney councils have responded to the issue of climate change and greenhouse gas emissions in a variety of ways. Although they continue to educate their communities, the NSROC councils have concentrated on leading by example by implementing programs and actions within their own facilities to reduce energy consumption and greenhouse gas emission. These councils have been helped through membership of the CCP program and by the introduction of guidelines for the development of energy savings plans. Further work needs to be done once more-obvious energy savings have been obtained, but these future savings will be increasingly expensive. A number of NSROC councils are also investigating a local government emissions trading scheme (LGETS).

Most significantly, all NSROC councils have adopted carbon-emission targets for their own activities and those of their communities. Many targets have evolved out of participation in the CCP program and are matched by a variety of council actions to ensure progress is made towards achieving the targets in the desired timeframe. A core problem for councils is how to measure emission accurately and also how to achieve significant reductions once

Willoughby Council City switch Project

Willoughby City Council has joined the national sustainability program CitySwitch Green Office in an effort to help local businesses reduce their contribution to climate change. The program helps commercial office tenants within participating LGAs improve their energy efficiency and reduce harmful greenhouse gas emissions.

The commercial office sector in its LGA contributes about 27 per cent of Willoughby's greenhouse gas emissions and represents an important focus area for the council, which was one of the first councils in

Australia to join the program. The council recognises the importance of working with our business community to meet the climate change challenge. CitySwitch Green Office aims to sign up 700 businesses by 2012, a goal that will see the program reach 76 per cent of commercial space in Sydney, Melbourne, Adelaide and Perth.



the first wave of efficiency measures have been implemented. Nevertheless, carbon-emission reduction remains one of the most important objectives of all NSROC councils, and this is only likely to increase when the national carbon emissions trading scheme is implemented.

Individual NSROC councils have shown considerable commitment to responding to climate change and reducing their greenhouse gas emissions. As a step towards achieving **Ku-ring-gai Council's** corporate greenhouse reduction goal of 20 per cent by 2010, \$233,800 has been invested in energy and water conservation upgrades as part of an energy performance contract. So far, 10 sites have been targeted, including the administration building, libraries, arts centre, golf courses and swimming pool. The projects have included lighting upgrades, lighting timer installations, zip boil heater timers, air conditioning and heating upgrades, building-management system installations, air-conditioning timers, smart water meters and automated lighting controls. This will achieve an annual reduction of 266 tonnes of greenhouse gas emissions – the equivalent of 3 per cent of the council's corporate emissions. Water consumption will also be cut more than 1900 kilolitres a year at the council's pool and golf courses. The council expects to cut electricity, water and operating costs by \$39,000 a year.

Lane Cove Council has previously achieved the second milestone in the Cities for Climate Protection program, and has set about achieving emission reduction goals in both the corporate and community sector. It also supported Earth Hour, organised by the WWF, by handing out beeswax candles to commuters during morning peak hour as well as in Lane Cove Plaza. The council continues to support and participate in the local government emissions trading scheme (LGETS). Given the large carbon footprint of residents in the LGA, it is likely that Lane Cove will be a net buyer of carbon credits, prompting it to be even more diligent at reducing greenhouse gas emissions. Along with the other member councils, Lane Cove is about to start the trial trading period, within which LGETS will encounter a number of the difficult questions facing the national trading scheme.

Hunters Hill Council is a partner of the ICLEI Cities for Climate Protection program, which sets a series of milestones for participating councils to achieve. Hunters Hill achieved the second milestone in November 2007 and has already started working towards the next – GHG reduction action plan. As part of Milestone 2, the council committed to achieving an emissions reduction of 50 per cent from corporate emissions by 2020 based on its 2005 levels and of 30 per cent from the wider community by 2020 based on 2001 levels.

North Sydney Council continues to tackle greenhouse gas emissions from its own operations through a number of initiatives, including the installation of energy efficiency and renewable energy initiatives, the purchase of GreenPower, waste recycling, and the use of fuel-efficient and hybrid vehicles. Photovoltaic panels have been installed at council's Ros Crichton Training Pavilion, while solar hot water systems have been installed at the North Sydney Olympic pool, at North Sydney Community Centre, and the Council Chambers. Passive solar design, heat pump hot water systems, energy-efficient lighting, lighting timer sensors and improvements to air-conditioning systems have also been implemented at a number of sites. The council chambers building is rated 4.5 stars (of a possible five) under the Australian Building Greenhouse Rating Scheme and is the only local government building rated among the top 10 green buildings in Sydney. The council also supports residents, schools and businesses in reducing water consumption and greenhouse gas emissions through the CitySwitch green office program, greenSchools initiatives and a range of community education offerings, including free workshops, events and energy assessments.

Green Business North Sydney – A Sustainable Business Initiative

Green Business North Sydney is an exciting new **North Sydney Council** initiative to partner with the local business community to reduce energy use, reduce greenhouse gas emissions and reduce business costs. Green Business North Sydney focuses on helping businesses reduce energy use by providing affordable, quality energy audits and installing energy conservation measures – either technological (lighting, air conditioning & heating, insulation, and so on) or behavioural, or a combination of both.

This program is open to all businesses within the LGA, and signatories to the City Switch Green Office program (formerly 3CBDs Greenhouse Initiative) will also be invited to participate.

Green Business North Sydney will provide reduced cost energy audits and energy conservation measures recommended by the audits to local businesses through a partnership with a service provider that will bulk-buy the audits and measures. This model has proven highly successful in the Hornsby business energy savings program (<http://www.hornsbychamber.com.au/energy/>) delivered by Hornsby Council in collaboration with the Hornsby and District Chamber of Commerce and Industry and Global Sustainability Initiatives (GSI). More than 82 businesses have completed the energy assessment stage of the Hornsby program since April 2008, and have benefitted from 21 per cent to 40 per cent reductions in costs associated with energy auditing.

The implementation of energy-conservation measures is under way. The program has also contributed to partnerships with industry experts investigating issues and barriers of greenhouse-gas reduction from insulation, lighting and split-system air conditioners.

North Sydney Council encourages businesses to take advantage of this opportunity to access affordable energy conservation advice and technologies. Recognition of business sustainability achievements is an important component of the Green Business North Sydney program including building customer recognition of local sustainable businesses.



The **City of Ryde** has committed to tackling climate change by developing a range of policies aimed at reducing greenhouse gas emissions. The greenhouse gas reduction action plan in conjunction with the energy savings action plan and the city's local air quality management plan 2004-09, outline a range of actions for reducing greenhouse emissions from both council and community sectors. As well as these policy documents, the City Of Ryde has established an internal multi-disciplinary team of staff known as the City Of Ryde water and energy strategy team to implement these and other environment and sustainability initiatives. For 2007-08, measures implemented have halted more than 781 tonnes of CO₂ emissions. The City Of Ryde is well on the way towards achieving its reduction goal of 30 per cent total greenhouse gas emissions based on 2003-04 levels by 2012-13.

Willoughby City Council has switched to 100 per cent GreenPower for its administration building and Chatswood Mall. GreenPower at these sites will save more than 1373 tonnes of greenhouse gas emissions a year. The council is also promoting the benefits of GreenPower to the community as an easy option for residents.

As of June 2008, **Hornsby Council** had further reduced its greenhouse gas emissions by 29 per cent and helped the community reduce its emissions by 4 per cent of 1995-96 levels. The earthwise at home – low carb living program helped 112 households install low-emission technologies, cutting emissions 407 tonnes a year (plus 155 tonnes from light bulb and showerhead refits). Further reductions are also likely because of behavioural changes (more than 330 residents attended energy-saving workshops). The council started a project to review climate change adaptation. This will help council decision makers understand and apply climate-change information to assess risks related to resource management, land-use planning, infrastructure and transport planning, local economic development, environmental management, community issues, and emergency services.

The council, in partnership with **Manly Council**, was successful in securing an accelerated action grant from the Department of the Environment and Water Resources. Part of this funding will be used to engage a consultant to undertake a feasibility study in achieving carbon neutrality for existing and future greenhouse gas emissions.

AIR QUALITY

The processes, phenomena and management approaches that affect regional air quality do not operate on one scale. The air around us is a mobile and dynamic resource, and therefore we usually do not think of air quality on a local or even a catchment scale – but at a regional level. The quality of the atmosphere can be affected by natural events including bushfires and dust storms, and human-induced activities, including motor vehicle emissions, coal-fired power generation and fuel burning for home heating. Poor air quality is usually associated with heavily populated areas where motor vehicle use is high, and where there's a high prevalence of industry and solid fuel-burning heaters in homes.

Community attitude surveys on environmental issues in Australia's urban areas repeatedly show the high value placed on access to clean air. Poor air quality has a direct impact on our health and wellbeing. High air pollution levels have been linked to health problems, including asthma and angina. Associations are also being demonstrated between air pollution and chronic health problems, such as lung cancer, bronchitis, cardiovascular disease and mortality. Keeping the air quality at an acceptable level can prevent health and environmental effects associated with poor air quality conditions. (*Noonan 2005*)

Overall, Sydney's air quality has been steadily improving since the 1980s. Significant contributors to anthropogenic emissions in Sydney include motor vehicles, major industry, household and commercial solvent use, household and commercial fuel combustion; commercial activities such as automotive repair shops; and domestic activities such as lawn mowing and solid fuel heaters. The NSW government's metropolitan strategy (2005) references the national air quality standards and sets out a series of environmental targets. One target is to reduce air emissions and improve compliance with national standards for air quality to protect overall health. However, it should be noted that it is not made apparent in the document or subsequent subregional strategies how this is to be monitored and achieved. Action for Air is the NSW government's 25-year air quality management plan for Sydney, and includes major measures for addressing air quality.

Figure 35: Contribution of motor vehicles to air emissions in major Australian cities, 2005 (*Noonan 2005*)

Carbon monoxide (CO)	Hydrocarbons (HC)	Oxides of nitrogen (NOx)	Particulates (< 10microns)
70-95%	40-50%	70-80%	10-50%

Pressure on Air Quality

As population density in the NSROC region rises, the incidence of vehicle usage will increase, with the potential of creating more frequent high pollution days. Natural processes can also increase high pollution days, with higher air-pollution levels across Sydney being more likely to occur on cooler, clearer nights. This is because temperature inversions restrain pollution from dispersing.

Councils, the National Parks and Wildlife Service and the Rural Fire Service conducts hazard-reduction burns of local bushland to reduce the risks to people, property and the environment from wild fires. But this activity can affect local air quality. Wild bushfires also affect air quality in a similar way, usually to a greater extent.

Air Quality in the Region

Air quality has improved significantly in the past 20 years, with reductions in carbon monoxide, nitrogen dioxide, sulphur dioxide and lead. In 1998, ambient air quality standards and goals for six pollutants were set in the national environment protection measure for ambient air quality. Concentrations of carbon monoxide, lead and nitrogen dioxide in Sydney are below their national standards and sulphur dioxide is well below its national standard. However, photochemical oxidants, ozone and particle pollution exceed air-quality standards at times. Emissions are mainly from motor vehicles, and although new cars produce fewer emissions, increased ownership of cars is offsetting any improvements. (*DECC, 2003*)

The NSROC has a strong interest in ensuring that a significant population increase in its region does not lead to overall air quality deterioration. Its major difficulty is that its councils have limited influence over problems of this type because when they occur, they are rarely limited to a single part of Sydney. Episodes where the air quality is poor are more likely to be experienced across a wide area of Sydney, so there are few steps that even groups of councils can take collectively to address causes.

CASE STUDY

Willoughby City Council – Air Quality Monitoring

The Ambient Air Quality Monitoring Station (AQMS) established in the grounds of Mowbray Primary School by Willoughby City Council’s Environmental Research and Audit Unit is now in its second year of operation. The AQMS was initially installed to monitor the existing background air quality as well as monitor the impacts of the Lane Cove tunnel ventilation stacks on the local shed and surrounding community. Data collected from the AQMS is also being provided for inclusion into the Air Quality & Respiratory Health Study being conducted by the Woolocok Institute of Medical Research.

The AQMS has been fully operational since January 2006 and equipment is recording ambient air quality data for Nitrogen Oxides (NOx), Carbon Monoxide (CO), PM 10 (particulate matter less than 10 microns

in diameter) and PM 2.5 (particulate matter less than 2.5 microns in diameter). Whilst there are large number of pollutants, which have historically shown to impact on air quality in Sydney’s airshed, these four pollutants are considered to present the greatest risk to the health and well being of residents within the local Government area. Motor vehicles are the greatest contributors to these pollutants, however industrial processes, wood fire heaters, bushfires and other combustion sources also contribute.

The data collected illustrates an exceedence in guidelines on 14 occasions. Between 1 July 2007 and 30 June 2008 NO₂ was exceeded 9 times and PM10 was exceeded 5 times. A report to be commissioned in the near future will review the air quality results obtained.

Figure 36: National Environment Protection Measure for Ambient Air Quality Guidelines

Pollutant	Averaging period	Max. concentration	Goal within 10 years Maximum allowable exceedences
Carbon monoxide	8 hours	9.0 ppm	1 day a year
Nitrogen dioxide	1 hour 1 year	0.12 ppm 0.03 ppm	1 day a year none
Particles as PM10	1 day	50 µg/m ³	5 days a year

An additional major concern is in relation to the dearth of systematic regional air quality data. There is only one permanent state-funded regional air quality monitoring station in the NSROC region. It’s located at Lindfield in the grounds of the CSIRO division of radio physics, close to Lane Cove National Park at an elevation of 60 metres in a residential area that represents part of DECC’s East Sydney air-quality reporting region. This site is currently not operating because of nearby construction work. Local monitoring is conducted by **Willoughby City Council** (see case study) and additional monitoring stations around Lane Cove have started operating.

Responding to Air Quality Issues

It is likely that global climate change will affect air quality in the Sydney region through elevated concentrations of ozone. The forecast growth of NSW’s population, and in private and commercial vehicle travel, will require a renewed focus on motor vehicle emissions. A strong emphasis on integrated land use and transport planning, including public transport planning, is needed. An increased uptake of hybrid vehicle technologies will also help achieve reductions in motor vehicle emissions.

Councils have a limited ability to respond to air-quality issues in an immediate manner. This is due to limited data on the extent and nature of the pollution events, difficulty in identifying the exact sources of air pollution, and the fact that licensing and regulation of polluting industries is a state rather than a local responsibility. Councils endeavour to help the state government when it comes to individual events. But apart from long-term planning decisions regarding where industry should be located and regulation of their own controlled-burning activities, councils’ primary response in this area relates to managing greenhouse gas emissions.

Landscape

The clearing of native vegetation, agricultural and urban development and irrigation have all contributed towards land degradation in Australia. The change in land uses brought about by European settlement has resulted in acidification of soils, rises in the watertable, increased soil salinity and erosion. (DECC, 2000)

The landscape in the northern Sydney region varies from highly urbanised environments to relatively undisturbed tracts of native bushland. It includes coastal estuaries, escarpments, steep ridgelines and farmed rural lands. The landscape has been undeniably altered through the process of human settlement and this change has accelerated from the period of European settlement until the present day through land clearing, urban development and consolidation.

Because of the steep inclines, gullies and undulating terrain of the NSROC region, and the presence of many natural water bodies contiguous to this terrain, the region is particularly vulnerable to accelerated erosion, nutrient run-off, flooding, sedimentation and the associated decrease in water quality.



ACID SULFATE SOILS

Acidic soils have developed naturally on sandstone parent materials in a number of locations in the Sydney basin. In coastal areas, land disturbance can uncover naturally occurring sediments and soils containing iron sulfides which, when exposed to oxygen, can develop into sulfuric acid. This has the potential to alter the soil's physical structure and damage vegetation growing in that soil. If the acid finds its way into water bodies it can have significant effects on riverine and estuarine ecologies (causing fish kills for example), as well as corroding man-made structures such as bridges and boats.

Disturbing Acid Sulphate Soils

The disturbance of potential acid sulfate soils associated with development activities such as excavation, drainage systems, piling, dredging and road causeway is a significant and dynamic pressure on the ongoing development of actual acid sulfate soils. Many residents in the northern Sydney region seek greater access and utility of low-lying coastal areas in which acid sulfate soils might exist. Development in these areas must be managed carefully, and known repositories of sediments rich in iron sulfides must be carefully mapped.

Managing Acid Sulphate Soils

The state government has already completed extensive mapping of acid sulphate soils. More detailed local mapping is still being done by some of the councils in conjunction with the Department of Lands. The NSROC councils have prepared, or are preparing, the appropriate planning instruments to ensure minimal disruption of acid sulphate soils. Some councils have adopted acid sulphate soils management plans in the event that acid runoff occurs because of soil disturbance.

SOIL EROSION

Soil erosion is a natural process that is caused by the action of wind and water, and which is accelerated by human activities. It's a major problem throughout Australia. The slow rate of soil formation in Australia means soil is effectively a non-renewable resource. Soil erosion leads to a loss of topsoil, organic matter and nutrients. It also degrades soil structure and decreases water-storage capacity, thus reducing fertility and the availability of water to plant roots. Soil erosion is therefore a major threat to biodiversity. It can also degrade floodplains, riverine and coastal water quality and aquatic ecosystems by significantly increasing sediment and nutrient loads. The costs to the community of restoration works and the decline of productivity from soil erosion are hard to quantify. The Sydney Catchment Authority has mapped all gullies in its area of operations and is systematically remediating

CASE STUDY

City of Ryde Remediation Site.

Responsible soil and water management was a major component of the remediation by *City of Ryde Council* of a former industrial site at 2-14 Wellington Road, Ryde. The site is surrounded by the Field of Mars reserve, and soil and water management measures were established from the onset of site works to prevent uncontrolled runoff during rain and storm events. Measures included conventional, temporary measures such as diversion berms and silt fencing, and also permanent built-in structures to provide ongoing runoff control.

The permanent structures included a number of clay-lined, coir-topped drainage swales, a central sedimentation basin into which the swales discharge, and a stone-lined energy dissipater for the controlled release of collected site water to down-gradient

bushland. These soil and water management measures, which also included mulching and replanting, have proved highly successful in storm events. The site is to be revegetated for inclusion in the surrounding reserve bushland.



Clay and coir-lined drainage swale. Note mulch over site to protect soil during revegetation.

and treating them based on their potential to deliver sediment. The effects of climate change, such as intensive storms and frequent bushfires, are likely to accelerate erosion. (*New South Wales State of Environment Report 2006, Department of Environment and Climate Change, December 2006, p 114.*)

Causes of Erosion

The common causes of soil erosion in the NSROC region are the loss of vegetation cover, modification of the soil landscape (by earthworks or compacting), and increases in surface runoff from impervious surfaces such as roofs, roads and footpaths.

Erosion is a particular concern around the many development sites throughout the region, where vegetation removal and earthworks expose and disturb soil layers. Erosional processes, such as wind and water runoff, transport soil particles through street gutters to local creeks where they can block drains, cause creek siltation, land instability, and facilitate weed invasions and deadly algal blooms.

Another effect of urban development is the replacement of natural, water-absorbing surfaces with impermeable concrete. This enhances flow velocities and the erosional force of water flowing off sites and onto adjoining areas, increasing rates of soil loss. Finally, increasingly poor weather conditions, including storms, high winds and drought, culminate in dieback of vegetation needed to stabilise soils.

Erosion in the Region

According to *Soil Landscapes of the Sydney 1:100,000 Sheet (1989)* most soils in the northern Sydney region are derived from Hawkesbury sandstone. These soils are often on very steep topography, and can be easily eroded. Areas on the steeper land around the foreshores are more easily eroded. In areas where the soil is highly erodible, disturbance should be kept at a minimum, and these areas should be protected by ground covers as soon as possible.

The amount of soil lost to erosion is difficult to quantify, and most reporting on erosion is observational and anecdotal unless it damages infrastructure or results in specific flood events. The NSROC councils are looking to develop indicators in this area, notwithstanding the inherent difficulty in quantifying erosion over such a large and diverse terrain.

Managing Erosion

Councils work actively to minimise erosion impacts through a mixture of land-use planning, development controls, water-management practices, education and regulatory enforcement. Because of the region's variable terrain and abundance of natural water courses and water bodies, particular care is taken in zoning land for development to ensure erosion and erosion-related impacts do not significantly affect the environment. Where major development occurs, the use of sediment and erosion controls are required with controls specified on development consents and enforced by council's regulatory officers or rangers.

The NSROC councils have introduced a number of development controls to reduce the impact on the local waterways, including requiring and enforcing the use of sediment controls on building sites, setting maximum site-coverage limits, and promoting the installation of rainwater tanks or the provision of storage to delay the release of stormwater. Councils have also been rehabilitating areas where stormwater drains enter creeks and providing rock armouring to reduce erosion potential. They also ensure appropriate controls around sites on public land where soil is disturbed, planting steeply graded banks and surfaces to retain soil integrity and managing storm water flows to minimise channelling and run-off impacts.

Most NSROC councils have information readily available for the management of soil erosion caused by construction, and work closely with the construction industry in an educational and regulatory role. In some cases, this information is provided directly with development consents which include specific erosion mitigation measures. The councils continue to develop educational materials and investigate new engineering solutions to address this ongoing issue.

LAND CONTAMINATION

Certain past and current land uses can potentially contaminate by introducing chemicals into the soil, posing a risk to human health and/or the environment. Depending on the level and type of contamination, this can inhibit certain

types of development. This may require remediation of some sites to allow future use without potential harm to human health and the environment.

In NSW, the management of contaminated land is shared by local councils, the DECC and Department of Planning. The Contaminated Land Management Act 1997 empowers the DECC to regulate and control contaminated sites representing a significant risk of harm to human health and/or the environment. Sites which do not pose a significant risk of harm, or where the level of contamination is unknown, are regulated by the relevant local council.

The Issue of Land Contamination

Many past industrial and agricultural processes are responsible for leaving behind contaminated material. Contamination can even occur on residential properties from excessive pesticide and herbicide use and from the flaking of lead-based paints. Contamination can affect both human health and ecosystem health. The significant pressure for the redevelopment of lands in the NSROC region in general, and the pressure to rezone industrial land for residential use in particular, means the issue of land contamination has become more pronounced. Added to this is a higher awareness of health effects relating to industrial process and the corresponding rise in the regulation of environmental health standards.

In some situations, the use of land can result in its contamination by chemicals. The DECC has developed a list of activities that may cause contamination, including agriculture/horticulture, landfills, service stations, engine works and dry cleaning. Before conducting a planning function in relation to a property, such as approving a development application, councils must consider whether the land has been used for one of the DECC-listed activities – and if so, whether it may be contaminated. Council records factual information about possible contamination or actual contamination on property planning certificates.

Contaminated Sites in the Region

The number of contaminated land sites in the NSROC region in the 2007-08 reporting period is as follows:

Figure 37: Number of declared contaminated land sites in the NSROC region, 2007/08	
Council	No of Sites
North Sydney	2
Lane Cove	1
Hunters Hill	2
Ryde	0
Ku-ring-gai	3
Hornsby Shire	0
Willoughby	2
NSROC region	10



Responding to Land Contamination

The remediation of contaminated sites is a slow, complicated, expensive process that can take years to complete. Therefore, preventing contamination through pollution control is critical. Continued state and local government co-operation is needed to ensure contaminated sites are adequately identified, appropriately regulated and satisfactorily remediated to ensure the land is suitable for its proposed uses. Because of the introduction of stronger environmental legislation and the licensing of industrial activities, it is unlikely that the number of new contaminated sites being created will rise dramatically. However, the prevention of new contamination requires continued vigilance by operators and regulators. State Environmental Planning Policy No 55: Remediation of Land plays a major role in preventing contaminated land from being used for a more sensitive purposes without appropriate investigation and, if required, remediation. (*New South Wales State of Environment Report 2006, Department of Environment and Climate Change, December 2006, p 132.*)

All councils continually monitor development in relation to contaminated sites. Councils work closely with the

DECC to ensure the contaminated land record is accurate and up-to-date. They also take the following steps to ensure land contamination is managed appropriately by:

- including information about land contamination on Section 149 planning certificates
- considering land contamination when assessing rezoning and development applications, and imposing conditions requiring remediation of land where appropriate
- developing a contaminated land-management policy.

City of Ryde adopted a draft contaminated land policy on May 20, 2008. This draft has been made under the Managing Land Contamination: Planning Guidelines and State Environmental Planning policy No. 55, and applies to all land in the LGA. It sets out a framework for managing contaminated land, and aims to:

- ensure that changes of land-use, or new development proposals, will not increase the risk to human health or the environment
- avoid inappropriate restrictions on land use
- provide information to support decision-making and to inform the community

CASE STUDY

Site contamination in Woolwich

Sites in Nelson Parade, Hunters Hill have been the subject of considerable media attention and speculation since the start of the year. Continued speculation and misinformation have created a significant sense of ill ease and stress within the local community.

Radium Hill was Australia's first uranium mine and even produced radium for the Curies in France. Prospector A. J. Smith, who at first thought the heavy dark rock was a tin ore, discovered the first sign of uranium mineralisation at Radium Hill in 1906. The Radium Hill Co took over the claim, and 600 tonnes of ore were mined by 1911. Other companies worked without success, and by the end of World War I, five shafts had been sunk and abandoned. The ore concentrate was treated in NSW and Victoria to yield several hundred milligrams of radium and a several hundred tonnes of uranium by-product.

In 1908, commercial mining began to extract radium for medical uses (for example, as a cancer therapy). A small on-site mill pre-concentrated the ore, with that output processed at Hunters Hill. Uranium is a waste product, also used in ceramics and paints. (*Uranium In Australia: A Detailed Timeline, 1869 to 1969, compiled by the SEA-US webmaster*) The mill also processed uranium for the purpose of extracting radium to be used in clock and watch making, and occupied a site covering numbers 5, 7, 9 and 11 Nelson Parade, Woolwich, from 1908 to possibly only 1911.

These are fairly well known and acknowledged facts. This facility was not a nuclear-processing operation, but certainly did leave deposits of radioactive waste



in certain locations. These locations are made clear in a report prepared by Egis Pty Ltd in 1999, based on a study undertaken by Sinclair Knight and Partners in 1987. (A copy of the report is available from the council).

There is a proposal by the NSW government to remediate the sites, and suggesting, as a guide, that 1250 cubic metres of material be removed. What seriously concerns the council and the community, are:

1. the wide and varied estimates of the volume of contaminated material
2. the exact sites upon which contaminated material is situated
3. the levels of radiation emanating from these sites
4. how and when the sites will be remediated

These sites are now subject of a NSW Upper House inquiry, and it is expected that results of this will be released in October. A copy of the council's submission is available at www.parliament.nsw.gov.au

Appendices

LIST OF THREATENED SPECIES IN THE NSROC REGION FROM THE ATLAS OF NSW WILDLIFE



Key:

The Atlas of NSW Wildlife is the NSW Department of Environment and Conservation's database of fauna and flora records. The following lists include entries in the Atlas marked as:

- V – Vulnerable (Threatened Species Conservation Act, 1995)
- E1 – Endangered (Threatened Species Conservation Act, 1995)
- E2 – Endangered (Threatened Species Conservation Act, 1995)

The Atlas States that the data it contains, while extensive, is by definition patchy. It will not provide full distribution of a species. Except in areas where comprehensive survey information has been incorporated into the database, the search results for a particular area are based on a mix of reported sightings.

LGA – Hornsby Shire Fauna Threatened Species

Scientific Name	Common Name	Legal Status
<i>Pandion haliaetus</i>	Osprey	V
<i>Ixobrychus flavicollis</i>	Black Bittern	V
<i>Callocephalon fimbriatum</i>	Gang Gang Cockatoo Population, Hornsby Shire & Ku-ring-gai LGAs	E2
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V
<i>Climacteris picumnus</i>	Brown Treecreeper	V
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V
<i>Stagonopleura guttata</i>	Diamond Firetail	V
<i>Falco hypoleucos</i>	Grey Falcon	V
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E1
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subsp.)	V
<i>Macronectes giganteus</i>	Southern Giant-Petrel	E1
<i>Neophema pulchella</i>	Turquoise Parrot	V
<i>Ninox connivens</i>	Barking Owl	V
<i>Ninox strenua</i>	Powerful Owl	V
<i>Tyto novaehollandiae</i>	Masked Owl	V
<i>Tyto tenebricosa</i>	Sooty Owl	V
<i>Litoria aurea</i>	Green and Golden Bell Frog	E1
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V
<i>Eubalaena australis</i>	Southern Right Whale	V
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E1
<i>Phascolarctos cinereus</i>	Koala	V
<i>Phascolarctos cinereus</i>	Koala in the Pittwater LGA	E2
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-wing Bat	V
<i>Myotis adversus</i>	Large-footed Myotis	V
<i>Dermodochelys coriacea</i>	Leathery Turtle	V
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V

LGA – Hornsby Shire Flora Threatened Species

Scientific Name	Common Name	Legal Status
<i>Olearia cordata</i>		V
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V
<i>Acacia bynoeana</i>	Bynoe's Wattle	E1
<i>Acacia gordonii</i>		E1
<i>Grammitis stenophylla</i>		E1
<i>Haloragis exalata</i>		V
<i>Haloragis exalata</i> subsp. <i>exalata</i>		V
<i>Pilularia novae-hollandiae</i>	Austral Pillwort	E1
<i>Callistemon linearifolius</i>		V
<i>Darwinia biflora</i>		V
<i>Darwinia fascicularis</i> subsp. <i>oligantha</i>	<i>Darwinia fascicularis</i> subsp. <i>oligantha</i> population in the Baulkham Hills and Hornsby Shire Local Government Areas	E2
<i>Darwinia peduncularis</i>		V
<i>Eucalyptus camfieldii</i>	Heart-leaved Stringybark	V
<i>Eucalyptus scoparia</i>		E1
<i>Kunzea rupestris</i>		V
<i>Leptospermum deanei</i>		V
<i>Melaleuca deanei</i>		V
<i>Micromyrtus blakelyi</i>		V
<i>Syzygium paniculatum</i>		V
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E1
<i>Genoplesium baueri</i>		V
<i>Ancistrachne maidenii</i>		V
<i>Grevillea parviflora</i>		V
<i>Grevillea parviflora</i> subsp. <i>supplicans</i>		E1
<i>Persoonia hirsuta</i>		E1
<i>Persoonia mollis</i> subsp. <i>maxima</i>		E1
<i>Galium australe</i>	Tangled Bedstraw	E1
<i>Asterolasia elegans</i>		E1
<i>Zieria involucrata</i>		E1
<i>Lasiopetalum joyceae</i>		V
<i>Pimelea curviflora</i> var. <i>curviflora</i>		V
<i>Tetratheca glandulosa</i>		V

LGA – Hunters Hill Fauna Threatened Species

Scientific Name	Common Name	Legal Status
<i>Ninox connivens</i>	Barking Owl	V
<i>Ninox strenua</i>	Powerful Owl	V
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V

LGA – Hunters Hill Flora Threatened Species

Scientific Name	Common Name	Legal Status
<i>Darwinia biflora</i>		V
<i>Genoplesium baueri</i>		V

LGA – Ku-ring-gai Fauna Threatened Species

Scientific Name	Common Name	Legal Status
<i>Nettapus coromandelianus</i>	Cotton Pygmy-Goose	E1
<i>Botaurus poiciloptilus</i>	Australasian Bittern	V
<i>Callocephalon fimbriatum</i>	Gang Gang Cockatoo Population, Hornsby Shire & Ku-ring-gai LGAs	E2
<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V
<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V
<i>Haematopus longirostris</i>	Pied Oystercatcher	V
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E1
<i>Lathamus discolor</i>	Swift Parrot	E1
<i>Polytelis swainsonii</i>	Superb Parrot	V
<i>Limicola falcinellus</i>	Broad-billed Sandpiper	V
<i>Ninox connivens</i>	Barking Owl	V
<i>Ninox strenua</i>	Powerful Owl	V
<i>Litoria aurea</i>	Green and Golden Bell Frog	E1
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E1
<i>Phascolarctos cinereus</i>	Koala	V
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-wing Bat	V
<i>Dermochelys coriacea</i>	Leathery Turtle	V
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V

LGA – Ku-ring-gai Flora Threatened Species

Scientific Name	Common Name	Legal Status
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V
<i>Acacia bynoeana</i>	Bynoe's Wattle	E1
<i>Grammitis stenophylla</i>		E1
<i>Haloragodendron lucasii</i>		E1
<i>Darwinia biflora</i>		V
<i>Eucalyptus camfieldii</i>	Heart-leaved Stringybark	V
<i>Melaleuca deanei</i>		V
<i>Syzygium paniculatum</i>		V
<i>Deyeuxia appressa</i>		E1
<i>Persoonia mollis</i> subsp. <i>maxima</i>		E1
<i>Tetratheca glandulosa</i>		V

LGA – Lane Cove Fauna Threatened Species

Scientific Name	Common Name	Legal Status
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E1
<i>Ninox strenua</i>	Powerful Owl	V
<i>Litoria aurea</i>	Green and Golden Bell Frog	E1
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V

LGA – Lane Cove Flora Threatened Species

Scientific Name	Common Name	Legal Status
<i>Camarophyllopsis kearneyi</i>		E1
<i>Hygrocybe anomala</i> var. <i>ianthinomarginata</i>		V
<i>Hygrocybe aurantipes</i>		V
<i>Hygrocybe austropratensis</i>		E1
<i>Hygrocybe collucera</i>		E1
<i>Hygrocybe griseoramosa</i>		E1
<i>Hygrocybe lanecovensii</i>		E1
<i>Hygrocybe reesiaae</i>		V
<i>Hygrocybe rubronivea</i>		V
<i>Melaleuca deanei</i>		V
<i>Syzygium paniculatum</i>		V

LGA – North Sydney Fauna Threatened Species

Scientific Name	Common Name	Legal Status
<i>Burhinus grallarius</i>	Bush Stone-curlew	E1
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V
<i>Ninox strenua</i>	Powerful Owl	V
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-wing Bat	V

LGA – North Sydney Flora Threatened Species

Scientific Name	Common Name	Legal Status
<i>Acacia terminalis</i> subsp. <i>terminalis</i>		E1

LGA – Ryde Fauna Threatened Species

Scientific Name	Common Name	Legal Status
<i>Pandion haliaetus</i>	Osprey	V
<i>Ixobrychus flavicollis</i>	Black Bittern	V
<i>Callocephalon fimbriatum</i>	Gang Gang Cockatoo Population, Hornsby Shire & Ku-ring-gai LGAs	E2
<i>Limosa limosa</i>	Black-tailed Godwit	V
<i>Ninox strenua</i>	Powerful Owl	V
<i>Litoria aurea</i>	Green and Golden Bell Frog	E1
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V
<i>Petaurus australis</i>	Yellow-bellied Glider	V
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-wing Bat	V

LGA – Ryde Flora Threatened Species

Scientific Name	Common Name	Legal Status
<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V
<i>Callistemon linearifolius</i>		V
<i>Darwinia biflora</i>		V
<i>Leptospermum deanei</i>		V
<i>Melaleuca deanei</i>		V
<i>Tetratheca glandulosa</i>		V

LGA – Willoughby Fauna Threatened Species

Scientific Name	Common Name	Legal Status
<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V
<i>Xanthomyza phrygia</i>	Regent Honeyeater	E1
<i>Ninox strenua</i>	Powerful Owl	V
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V

LGA – Willoughby Flora Threatened Species

Scientific Name	Common Name	Legal Status
<i>Acacia bynoeana</i>	Bynoe's Wattle	E1
<i>Eucalyptus camfieldii</i>	Heart-leaved Stringybark	V
<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E1
<i>Tetratheca glandulosa</i>		V



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