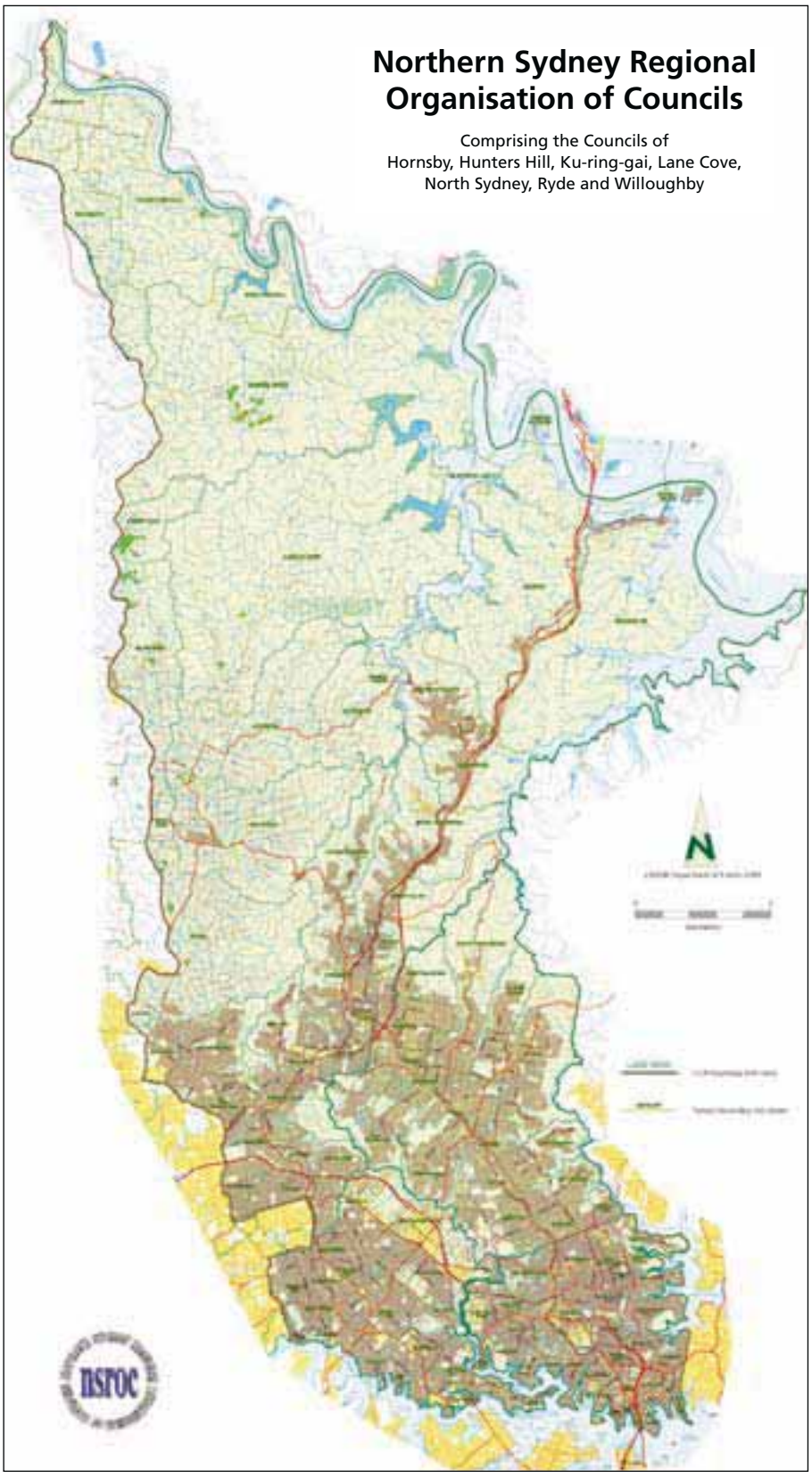
NORTHERN SYDNEY REGIONAL ORGANISATION OF COUNCILS
STATE OF THE ENVIRONMENT REPORT
2005 / 2006

Northern Sydney Regional Organisation of Councils
nsroc



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PRESIDENT'S MESSAGE

It has now been twelve months since the seven councils (Hornsby Shire, Hunter's Hill, Ku-ring-gai, North Sydney, Lane Cove, City of Ryde, and Willoughby City) which comprise NSROC released the first regional State of the Environment (SoE) report for the northern Sydney Region. The first regional SoE was very well received by both the community and environmental professionals and encouraged the NSROC councils to continue with producing a regional report. This year we have provided a great deal of supplementary material in addition to building on the data sets and narrative contained within the first report.

The intervening period between the reports has been marked by increasing community concern over water shortages, global warming, population impacts and transport issues. The NSROC councils have been working diligently with their communities and the state government to try and address the challenges these issues present in a cohesive and consultative way. A number of the councils have initiated innovative management strategies and projects, and there is also an ever increasing focus on sustainability. While all the councils continue to run strong bush care and stream remediation programmes, the health of our bushland and waterways remains a strong concern. Our data demonstrates that a number of our creeks are under significant pressure from development and disturbance and will require careful management into the future to ensure they remain viable ecosystems.

It was with a great sense of relief that I learnt the state government has shelved its controversial plans to build a large-scale desalination facility in southern Sydney. While the supply of drinking water is a fundamental necessity for Sydney, all spheres of Government must take a leadership role in identifying sustainable and appropriate environmental solutions to the problems we face. The proposed desalination plant sent exactly the wrong message to our communities; instead of advocating re-use, recycling and an overall reduction in potable water use, it instead favoured an incredibly energy intensive process to supply what only amounted to a small portion of Sydney's total water need. While the drinking water crisis has been temporarily averted due to other measures being implemented, we must all remain vigilant to ensure that short term measures are not employed by governments which do not look at the bigger environmental picture.

The federal government has so far refused to sign the Kyoto Protocol which would lock Australia into a commitment to reduce greenhouse gas emissions. The issue of climate change and the impacts that are being experienced right now are compelling individuals and communities around the world to take action. The NSROC councils are doing their bit and all of them are reviewing and reducing their own energy consumption as well as working with, and educating, their communities. Like water, energy is going to be one of the biggest challenges Australia has to face over the coming decades. We must act now to ensure that the beautiful environment of the northern Sydney region is not irretrievably damaged due to a stubborn reluctance by politicians, industry or individuals to recognise the issues and adapt their practices and policies appropriately.

In many areas the northern Sydney councils are on the cutting edge of environmental innovation and with our strong environmental heritage and relative prosperity we have the opportunity to show leadership both within the region and beyond. Again I commend this regional SoE report to you as the next step in ensuring that 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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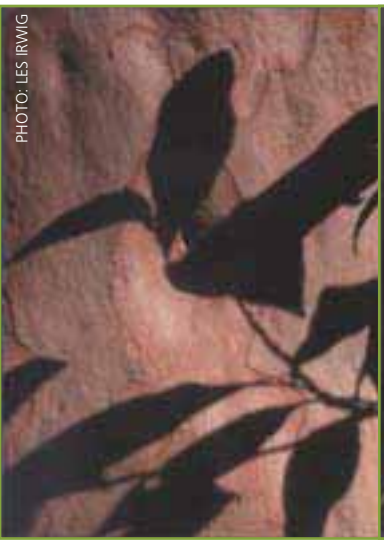
Ainsley Martlew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ACRONYMS

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
DEC	Department of Environment and Conservation (formerly known as NSW EPA, see below)
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 DEC)
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	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 over 681 square kilometres and is home to over 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 Hunters Hill which are collectively represented by NSROC. The region is home to a varied collection 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 number of people who inhabit the region, the fragility of the environmental ecosystems and the lack of comprehensive scientific data regarding environmental sustainability.

Community, residential and tourist surveys regularly indicate that one of the chief attractions of the NSROC area is its environmental attributes. These attributes are commonly identified as an abundance of open space, healthy natural ecosystems, mature and substantial urban tree-scapes, 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 over recent years exacerbated by the recent property boom. While 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 on-going accumulative environmental impacts of over half a million people, has had inevitable environmental consequences.

For this reason the seven councils, which collectively make up NSROC, commissioned three studies, completed in 2005, to provide background information, data, recommendations and analysis of issues vital to the long term sustainability of the region. 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 states: "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.

In recognition of 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 coordinated and collective fashion.

STATE OF ENVIRONMENT REPORTING

Since their inception, the northern Sydney councils have played a key 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 New South Wales 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 impacts we are having on the environment and enable us to manage those impacts and make necessary environmental improvements.

According to legislation, an SoE report must:

- Address the eight environmental sectors of land, air, water, biodiversity, waste, noise, Aboriginal heritage 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 impacts and related activities, including management plans relating to the environment; special council projects relating to the environment; and the environmental impact 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. Last year, the first regional NSROC SoE report was completed. This year (2005/06) is a supplementary report which builds upon the data reported in the previous year.

In order to reach a stage where a regional SoE 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 and through time. This has proved a significant challenge, as while all councils are required to report against key identified environmental issues according to the legislation, each council has chosen their own way of interpreting these reporting requirements. They have also gathered data through different methodologies and emphasised different issues according to what is impacting 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.

The structure of this report is designed to meet the requirements of providing an accessible environmental reporting tool for the 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 of the report has been constructed around the accepted standard of reporting known as the 'State-Pressure-Response' model utilised 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 process of developing a regional SoE has identified a number of challenges in producing future reports. The first is that the heterogenous nature of the reporting systems and processes of the seven members of NSROC has meant that it has been difficult to obtain complete and robust data sets and core indicators which are relevant to the entire region. This issue has been in part resolved by the fact that the northern Sydney councils have for some time been working together to ensure that reporting systems and indicators are standardised, however it is noted that more work can still be done in this area.

The second challenge has been the lack of quality research and monitoring carried out in the region, and hence an inexact understanding of many of the pressures facing the region. There is only one permanent state funded air quality monitoring station in the region and local government is not adequately equipped or resourced to do its own monitoring beyond a few local sites. The lack of detailed research and comprehension of the data, coupled with declining council revenue as a result of on-going rate-pegging and cost-shifting, provides a significant constraint on the comprehensive analysis and response to environmental issues.

Finally, not all of the environmental 'story' for the region is negative, as many of the environmental indicators in this report demonstrate. The northern Sydney councils have achieved a lot through comprehensive approaches to environmental issues and they have demonstrated a leadership role for the community in environmental programs aimed at creating environmental awareness and developing environmental sustainability. Furthermore, some councils have been able to raise funds through the application of special environmental levies where a clear connection between the monies raised and the environmental benefit from its expenditure can be demonstrated.

NSROC, the councils and their communities have had a number of successes in restoring degraded environments; controlling or eradicating invasive species; reducing resource consumption; identifying new environmental threats; conserving fragile or endangered ecological communities; and changing long standing social habits which have negative environmental consequences. The councils continue to show innovation in meeting environmental challenges, in integrating sustainability principles in all that they do, and in allocating appropriate resources to ensure the right environmental outcomes are achieved.

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Towards Environmental 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.

NSROC council	Expenditure 2005/06	Population of LGA (estimate for 2005/06)	Area of LGA (square kilometres)
Hornsby	$36,472,929	157,622	509
Hunter's Hill	$1,912,765	14,080	6
Ku-ring-gai	$17,278,000	108,830	84
Lane Cove	$6,506,990	32,326	11
North Sydney	$20,819,000	60,944	11
Ryde	$27,235,823	100,510	40
Willoughby	$24,655,000	63,959	23
NSROC Total	$134,880,507	538,271	683

Figure 1: Total Expenditure on Environment by council 2005/06

LIMITATIONS

While 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 therefore 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 in this area, notwithstanding the inherent difficulty in SoE reporting on socioeconomic data sets and information.

CONSULTING WITH OUR COMMUNITIES

Willoughby City Council has undertaken extensive community and stakeholder consultation as part of the Willoughby City Strategy. This involved vox pop interviews, surveys and forums with focus groups. The top things people wanted for the future was a sense of community, improved traffic and transport, sensible population growth to manage urban development impacts and improved access to open space and community facilities.

North Sydney Council in partnership with the local community has developed a 2020 Vision: Directions for our Future. The 2020 Vision adopted in 2005/6, was developed over a ten-month period and involved an extensive consultation process. To encourage a diversity of opinions a wide range of consultative methods were used including telephone and walk-up surveys, public forums, focus groups, website activities, a children's art competition, feedback stalls at local events, Councillor and staff workshops, visits to schools, community and youth centres, aged care facilities, social housing, and. More than 1,000 people responded with what they valued, what concerned them and what they hoped North Sydney would look like in 2020.

Key visions identified included:

- A greener, cleaner and environmentally responsible North Sydney;
- An urban environment that is well designed, welcoming and safe;
- A reliable, accessible and sustainable transport system;
- A vibrant and thriving city centre;
- Expansion of local open space and high quality recreational facilities;
- A diverse sense of community.

CASE STUDY

The Hunter's Hill Council Cultural Plan

The Hunter's Hill Council Cultural Plan has been developed to clearly reflect the community's ideals of a sense of history, community, environment and culture. The Plan details the opinions and attitudes of residents of Hunters Hill.

The policy framework that has guided the development of this policy includes:

- Establishing and developing a policy that relies on sustainability;
- Making best use of the existing resources in the community and seeking opportunities for continued growth of cultural facilities;
- Promoting existing community groups and seeking ways in which to support 'new' groups that may be created in the future;
- Being inclusive of all members of the community: listening to the young and old, those with children and those from culturally and linguistically diverse backgrounds, and those with a disability;
- Promoting positive communication between Council and residents, and instilling a cooperative relationship for building cultural life in our area;

- Engaging different community organisations and groups as partners in a shared vision for the Hunter's Hill Council Cultural Plan; and
- Integrating cultural strategies with Council's broader priorities and objectives. The cultural plan is developed in conjunction with Council's social plan and Strategic Management Plan.

The Hunter's Hill Council Cultural Plan also recognises that Council is part of the larger Northern Sydney Regional Organisation of Councils (NSROC). A regional approach gives strength to local initiatives so that advice, resources and shared values can be included in Council's strategies. Hunter's Hill Council will take a coordinated approach with other NSROC council's for the implementation of the Cultural Plan.

As part of Ku-ring-gai's Town Centre redevelopments, extensive community consultation has been undertaken throughout the process. The community has been consulted and kept up-to-date with the process through many different mediums including, formal exhibition of draft DCPs and LEP, resident briefing sessions, continual updates of all information on Council's website, and displays of 3D models providing a better perception of how the developments are likely to change the visual environment. Feedback from all the community consultation has been used to shape the developments of these town centres.

In November 2005, the City of Ryde conducted a follow up to its City Vision consultation to assess if Council was heading in the right direction and to confirm the Vision for 2006. The changes residents desired were less traffic, better shopping and less high density housing. Additionally, they would like better transport, more green areas, trees and parks in the future. Findings indicated that safety, cleanliness and 'greening' are still high priorities for the future confirming the outcomes of the 2003 survey.

COMMUNITY ACTION

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

The councils run a large number of programs with their communities 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.

Willoughby City Council – City Strategy

The Willoughby City Strategy is a long-term vision and plan for the future of Willoughby City to help guide decision making and planning for the next 15 years. The Strategy aims to:

- Identify what the community values about the area;
- Identify important issues and challenges for the future;
- Agree on future directions and long-term goals; and
- Set strategies to achieve these goals.

It is a plan based on community visions, values and aspirations. Council has worked closely with its communities and stakeholders (residents, businesses, government agencies and other interest groups, Councillors and Council staff) through a series of workshops, surveys and interviews to ensure that the Strategy responds to local community needs and aspirations.

The City Strategy has overarching principles which form the basis of the Strategy and underpin its actions. One of these overarching principles is a sustainable Willoughby. Limiting our ecological footprint through the efficient use of resources, protecting the natural environment and encouraging biodiversity so that Willoughby City is improved for current and future generations. A sustainable community engages openly and freely, it respects and celebrates diversity and our heritage, and collaboratively addresses long-term social and economic well being.

Working with the community to create a sustainable Willoughby

CASE STUDY

Some of the projects undertaken throughout the region in 2005/06 are as follows:

- Willoughby City Council has initiated the 'Sustainability Street' program developed by Vox Bandicoot. The program encourages people to get together in local communities to learn about sustainability and to assist and encourage each other to live more sustainably. Sustainability Street is about getting to know your neighbours and improving the environment in the home and the community.
- Lane Cove established a 'Sustainability Advisory Committee' in November 2005. This committee comprises community members, Councillors and Council staff and is a consultative forum to assist Council in formulating and implementing sustainability strategies and initiatives.
- Hunters Hill Waste Watchers Program was delivered to local primary schools under the Keep Australia Beautiful Campaign. Topics included: waste avoidance and minimisation; reuse and recycling; composting and worm farming; sorting waste into correct bins; litter; and stormwater management.
- City of Ryde Council has been working with the Australian Conservation Foundation on implementing the GreenHome community workshop series in Ryde. Workshops have been held on waste reduction and water and energy conservation. Council officers also participated in the UTS Sustainable Community Workshop at Ryde TAFE in November exploring themes of sustainability and community, and commenced Environmental Awareness Story Times in conjunction with library services to encourage people to use the library for educational and recreational purposes. World Environment Day in June saw Council distribute over 52 'Ecotastic' environmental board games to 26 local primary schools.
- Ku-ring-gai Council staff have been working with residents surrounding Turramurra and Pymble to improve the condition of local bushland. The Face to Face Program offers free, personalised advice on how to manage weeds and gardens. The program represents a partnership between residents, local businesses, Ku-ring-gai and City of Ryde Councils, the Department of Environment and Conservation (DEC) and the Ku-ring-gai Bushcare Association.

- Hornsby Shire Council ran 'The earthwise at home program' taking broad and topic specific sustainability workshops and activities to the community. Developed from a pilot session held in April 2005, the program series was developed and delivered using the principles of learning for sustainability to meet the objectives of the United Nations Decade for Education for Sustainable Development. Working with residents, private sector and government agencies, tailored workshops and site visits were delivered to meet the specific needs and expectations of community members. Evaluation showed that the program resulted in increased community participation in actions and practices for a sustainable future. As part of the program 1600 water and energy kits and 230 broad home retrofit kits were distributed. Thirty households had full audits and reports were prepared by the Department of Energy Utilities and Sustainability including the star rating for the home. Most exciting was the emerging attitude change in line with learning for sustainability, "We have all evolved further than we thought. We wanted to see the bills reduced; we didn't expect to change mindsets".
- North Sydney Council held their annual environmental and cultural exchange program called 'Bridges to Boorowa' which involved over 50 volunteers and five Council Bushland staff travelling to Boorowa to plant corridors of indigenous flora on farms with degraded and/or salinity effected land. The program seeks to build long-term relationships between city/urban dwellers and our rural counterparts in order to address environmental, social and economic issues.
- North Sydney and Lane Cove Council are currently implementing a program called Sustainable Cities. This project looks at the ways businesses currently operate and identifies opportunities for them to be more environmentally sustainable. It encompasses capacity building through training workshops, community education through face to face sustainability surveys, audits and provision of a manual for small businesses; and communication and publicity through newsletters and local press articles.

Delivering the Waste Watchers Program to local primary schools: topics included waste minimisation, recycling, worm farming; sorting waste and stormwater management.

CORPORATE ACTION

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

Each year, councils prepare a Management Plan that identifies 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 longer-term financial position of council.

Councils work in an environment of constant financial pressure due to 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.

Hornsby earthwise discussion group

Hornsby Shire Council – Triple Bottom Line

Over 2005/2006 Hornsby Shire Council has progressed a move to both increase transparency in decision-making and ensure that all aspects of sustainability are considered by decision-makers across the organisation. Triple Bottom Line (TBL) is identified as a key initiative within Council's Management Plan and this first year has been one of development and evaluation – of a framework, systems and staff training.

Key underpinning intentions of the roll out of TBL were inclusiveness and the development of skills and understanding of sustainability for all members of the organisation. The process of moving to TBL has therefore been as important as the decisions made when referring to Council reports. Twelve months on, TBL is now applied through two integrated 'streams' – the decision making process and the reporting process.

Processes

Since its establishment, the internal TBL Working Group has taken an open and adaptive approach to embedding TBL into existing processes. It has progressed the incorporation of TBL into Council's Management Plan, the development of a TBL Checklist for all Council Business Papers and has trained all senior staff and Councillors. Using the findings of pilot studies, and staff surveys, training was developed around individuals' core understandings of sustainability and local government roles and responsibilities. Building around these core components and principles of sustainability training was adapted for Councillors, Senior Management and report writers needs.

Reporting

The TBL Working Group identified the need to closely align TBL to Council's Strategic Themes. By using the same themes that provide strategic direction for Council, decision-makers are better able to align progress towards not only the requirements for sustainability under the Local Government Act, but also Council's vision.

This approach has been comprehensively evaluated by the University of Western Sydney (UWS) through the observation of staff workshops, focus groups and analysis of TBL summaries in the Business Papers.

Where next?

The evaluation identifies that Council has developed a leading reporting culture with significant expertise and investment in sustainability indicators. However, further work is required to both embed the process across the organisation and to develop TBL measures that assess the impacts of the organisation itself rather than external conditions. Key recommendations, including alignment to the Global Reporting Initiative, will be followed up during 2006-07, as Council further integrates and aligns its strategic and reporting processes to position itself as a national and international leader of public sustainability reporting.

CASE STUDY

Councils have been active in developing long term management frameworks and goals which assist their communities and council in achieving 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 (ICLEI) which identify specific corporate requirements and actions to introduce sustainable resource use into council activities.

Lane Cove Council is continuing to implement actions identified in the *'Think Global – Act Local Sustainability Plan'*. One example is the development and implementation of a new vehicle fleet policy with the view to improve the Council's environmental performance. This was achieved by utilising greener energy sources. Staff are encouraged to use vehicles such as the hybrid-electric Toyota Prius, Volkswagen diesel Golf and Holden/Ford vehicles with LPG capability, as well as the use of smaller, more fuel efficient cars. In addition the use of public transport by staff is encouraged by the new 'Travel Smart' policy which allows staff to pay for annual public transport tickets through weekly salary sacrificing.

Hunters Hill Council has adopted the following environmental management goals for the next five years:

- **Water** – to efficiently manage water resources and improve water quality in local catchments, in streams of the lower Parramatta River and Lane Cove River.
- **Waste** – to effectively manage waste in the municipality and minimise the amount of waste produced.
- **Energy** – to effectively manage energy use and reduce greenhouse gas emissions in the municipality.
- **Biodiversity** – to protect and enhance the municipality's biodiversity.

Willoughby City Council uses a Triple Bottom Line (TBL) approach to introduce sustainability outcomes into its operations. TBL is a framework that underpins and reviews environmental, economic and social performance. All projects requiring funding over $10,000 require a TBL assessment to ensure all projects consider the environmental, economic and social impacts.

Another developing approach is 'ecological footprint' analysis that attempts to quantify the ultimate impact of economic activity on the environment. The technique estimates the area of land required to provide the range of goods and services consumed. Land area is used as a common unit of measurement to allow comparisons across time and different populations. Estimates include the land required for water collection, waste disposal, food and energy production, transport and residential occupation.

The wide variety of schemes and actions adopted by councils is illustrated by the sustainability plans in operation in North Sydney Council as at 2006. These include the: 2020 Vision, Footprints Education Program, Towards Sustainability Plan, Water Management, Local Environment Plan 2001, Development Control Plan 2002, Greenhouse Action Plan, Bushland Rehabilitation Plans, Open Space Plans, Social and Community Plans, Environmental Management System (EMS), Sustainable Schools Program, Australian Business Greenhouse Rating Scheme, Bushcare, Vehicle Tariff Scheme, International Council for Local Environmental Initiatives (ICLEI) Cities for Climate Protection (CCP), ICLEI Water Campaign, Sydney Water Every Drop Counts, Go-Get Car Sharing Scheme and the Environmental Levy.

City of Ryde has been developing its Sustainability Strategy with its Community Environmental Management Strategies Steering Committee. The Strategy will outline corporate and community objectives and actions. The Council reporting process has seen the implementation of the requirement to consider and report on environmental, economic and social outcomes in reports to council. The Environmental Education Team continues to work towards achieving a sustainable workplace at the council. A Green Purchasing Policy is currently being developed and sustainability audits have now been undertaken in every council building, with suggested water, energy and waste reduction initiatives implemented. The vehicle fleet policy has also been amended so that staff can now pay a smaller rate and chose four-cylinder cars and hybrid vehicles for their council car.

Ku-ring-gai Council has taken a strategic approach to reducing both water and energy consumption at Council facilities. Council has developed an Energy and Water Action Plan which specifically targets Council's top 38 energy and water consuming sites providing recommendations to reduce the consumption. As part of the implementation of the Savings Plan, Council is currently investigating Energy Performance Contracting as a way of financing a larger scale effort to reduce energy consumption at Council facilities. In addition to the Savings Plan and as part of participating in the Cities for Climate Protection program, Council has recently updated the Greenhouse Action Plan which recommends actions to reduce both corporate and community greenhouse emissions. Together, these two plans encompass all areas of energy and water reduction within Ku-ring-gai.

2

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.

In more recent times, the NSROC area, like the rest of Sydney, has been under substantial and continual pressure to accommodate a quickly growing population. Residents in the region have been active in ensuring that the natural heritage values of the region are protected and managed in a sustainable manner in the on-going push for further urban consolidation.

The high property values in the NSROC region are in part a reflection of the region's success in retaining its 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. While 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 the key 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 over the coming 30 years. The Strategy anticipates growth of around 40,600 people a year over this period – two thirds by natural growth and 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 historical growth patterns and values of the region.

While the actual population growth targets for the region have not been released by the State Government, it is estimated that they will be between approximately 120,000 and 150,000 people over the next 25 years. *(Le Bransky 2005)*

Under such significant population pressure, urban development must be carefully managed to ensure environmental impacts are managed, and while this will be assisted by a regional plan which posits growth in already developed centres, this remains one of the greatest challenges to the councils of the region.

Urban Development and Construction

Across the northern Sydney region there is a wide diversity of land uses and urban development pressures. 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 decrease and more people live on their own, 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 which is limiting the socio-economic spread within the community.

Apartment living: as the size of families decrease and more people live on their own, the number of one-bedroom and studio apartments has risen.

Much residential intensification that has occurred in the region has taken place in existing commercial zones, especially around rail 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.

Council	Number of Commercial DAs	Number of Industrial DAs	Number of Residential DAs	Number of Aged Persons Housing DAs	Other
North Sydney	139	0	503	incl in residential	80
Lane Cove	70	19	404	0	0
Hunters Hill	11	0	283	2	0
Ryde	288	45	728	0	41
Ku-ring-gai	90	0	998	5	308
Hornsby Shire	23	2	214	110*	56
Willoughby	373	59	631	0	44
NSROC region	994	125	3,761	117	529

Figure 2: Number and type of development applications (DAs) in the NSROC area, 2005/06

**The Metropolitan Development Program (MDP) 2005 forecast that there would be 110 aged persons dwellings completed in the Shire for the 2005/06 financial year.*

Figure 3:
Number of new dwellings in the NSROC region, 2005/06

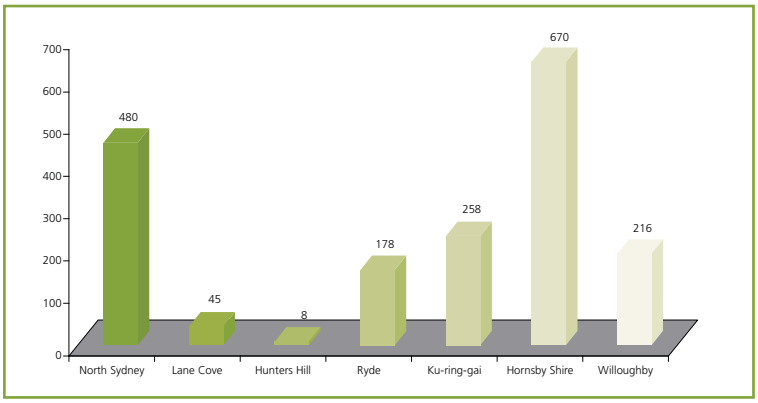
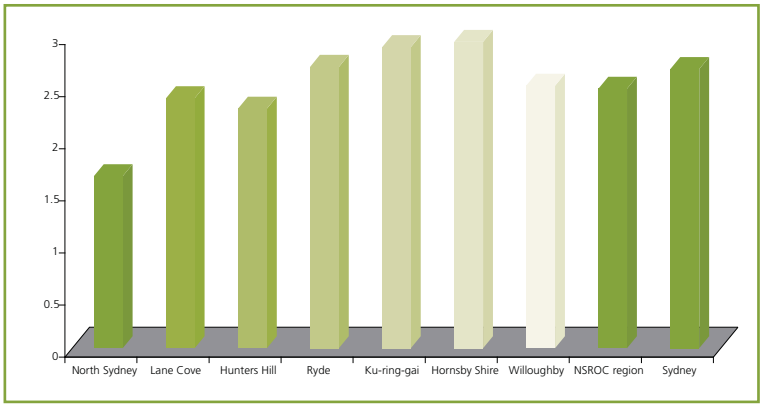


Figure 4:
Average number of people per household in the NSROC region

Data from the Australian Bureau of Statistics (ABS) 2001 Census.



Council	Business	Industrial	National Park	Open Space	Residential	Roads	Special Uses	Rural	Unzoned	Other
North Sydney	6.30	0	0	16.75	44.70	25.15	5.41	0	0	1.70
Lane Cove	2	6	0	15	52	19	6	0	0	0
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	0.56	0	19.72	16.52	43.78	11.50	4.49	0	0	0
Hornsby Shire	0.40	0.40	49.90	5.20	9.40	No data*	3.30	15.70	No data*	15.70
Willoughby	2.32	4.08	0.35	20.05	49.41	18.21	4.73	0	0.01	0.85
NSROC region	2.08	2.06	10.85	13.65	42.33	18.31	7.56	2.24	0.17	3.65

Figure 5: Percentage of land use by LGA in the NSROC region, 2005/06

**Data is unavailable. For historical data on this area please visit www.soe.hornsby.nsw.gov.au*

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 flats 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 town house 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 for future growth. 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 in the development of the strategy. Together they have procured a number of reports to answer key issues associated with the economic, environment and social development that such growth entails. The councils are also actively 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 is in the process of developing 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.

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 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 assist 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 or redevelopments of existing buildings. It remains unclear whether the state government is committed to introducing the wider application of BASIX in this manner.

BASIX: Introduced by the NSW Government, to ensure homes are built to be more energy and water efficient.

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 assist homeowners achieve BASIX certification. The planting of Australian native plants can input into the BASIX score, and the North Sydney Council's Native Havens Program can help by providing free native plants and by offering advice on the right local native plants to select.

Hornsby Shire Council at its meeting on 5 April 2006 resolved to adopt a draft Local Environmental Plan (LEP) and draft Development Control Plan (DCP) amendments to complement the operation of the State Government's Sustainable Building Index (BASIX). Sustainable Building elements are proposed 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 DCPs. The elements promote development that reduces potable water and energy consumption and results in the improvement in the thermal performance of a residential building. The elements include both applicant and Council responsibilities concerning BASIX requirements at the design, lodgement, assessment and determination stages of a development proposal affected by BASIX. The draft LEP has been forwarded to the DOP for gazettal. The draft Sustainable Building DCP amendments will come into force upon gazettal of the draft LEP and a notice appearing in local newspapers advising of their adoption.

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 locally important environmental assets. More building usually means less natural soil coverage, less greenery, less tree canopy cover, increased impacts from stormwater run-off, more wind impacts and less natural sunlight being available 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 that is vital for the safe and sustained survival of all life in the region; result in an increase in intrusive noise; or 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 growth is associated with a range of issues, such as energy consumption, transport and waste management.

Population Data for the Region

Below are estimates of the population of the NSROC region based on the figures provided by the Australian Bureau of Statistics (ABS). It should be noted that the figure for 2005 is preliminary only and may change. While the region has experienced significant growth over the last decade, the data illustrates that the 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 changing demographics of the region, with high property prices meaning fewer families are moving in, and thus household size (and hence total population growth) is decreasing. The provisional data from the ABS for 2005 indicated a pronounced dip in population growth. If this data is confirmed in due course then some of the principles for current land use planning will have to be revisited.

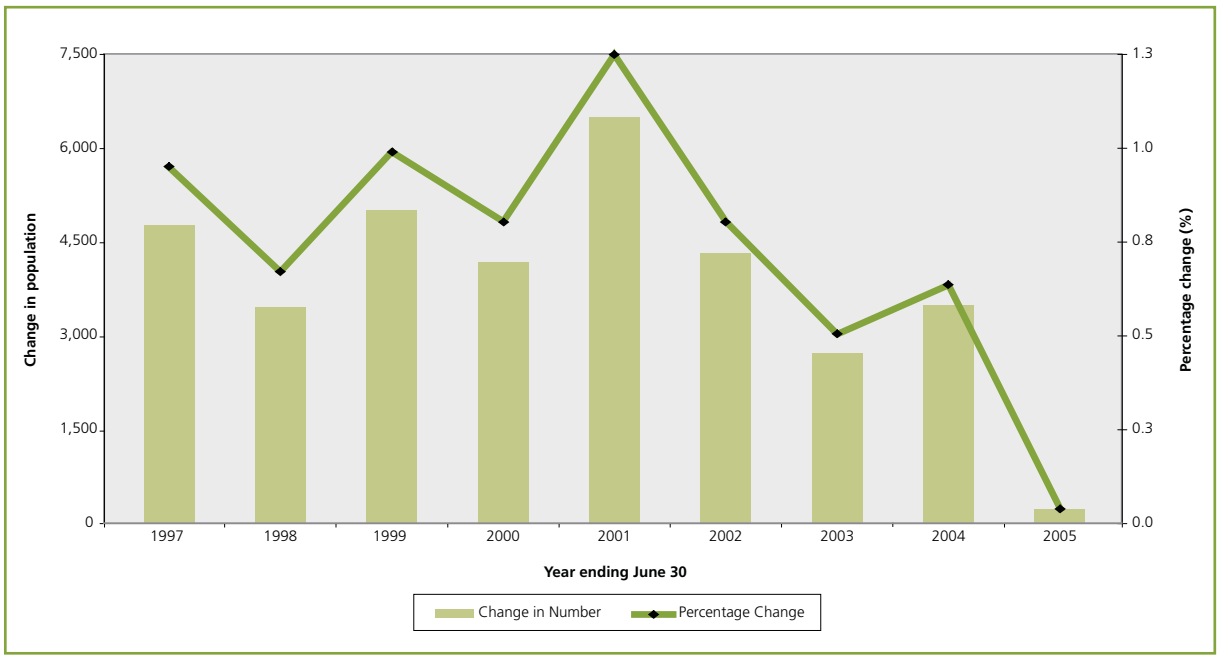


Figure 6: Change in NSROC's estimated resident population for the year ending June 30, 2005

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 over-arching policy directions, and to provide substantive detail in regards to housing, employment and infrastructure provision.

Two sub-regional Strategies covering the NSROC region are expected to be released by the DOP in late 2006 or early 2007. The strategies cover the North (Ku-ring-gai and Hornsby) and the Inner North (Willoughby, Ryde, North Sydney, Lane Cove, Hunters Hill and Mosman). Combined the sub-regional strategies are expected to set a target of over 50,000 new households and over 60,000 new jobs over the next 25 years. The community will have their first opportunity to comment on the sub-regional strategies once they are placed on exhibition. While local government has been consulted with in the process of developing the sub-regional strategies a number of key areas of concern remain for councils. These include whether there will be adequate provision of infrastructure identified in the strategies, whether the housing targets are achievable, and whether councils really have any potential to influence job creation in their localities under current governance and funding arrangements.

CASE STUDY

Concept drawing for the re-development of Turramurra Towncentre

Ku-ring-gai Council – Urban Development

Ku-ring-gai Council is currently redeveloping six town centres to revitalise areas and accommodate population growth. The redevelopments are based around public transport nodes to reduce increased pressure on the road system and to encourage greater use of public transport. The redevelopments are designed to produce a sustainable outcome whilst providing for an increasing population. The DCP includes provisions for sustainable energy and water consumption, and the protection and enhancement of biodiversity at the sites.

Although the process is not yet complete, it is anticipated that a regionally planned approach to population growth, rather than ad-hoc or simplistic approaches used previously, will greatly assist in reducing the impacts from 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 been working together to create their own draft Regional Strategy. This identifies the key planning policies and issues in the region and sets 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 close 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 the irreversible changes are managed as much as possible in an environmentally sustainable manner.

CASE STUDY

The City of Ryde – Macquarie Park Corridor

The Sydney Metropolitan Strategy has identified the Macquarie Park Corridor in the Ryde LGA as an integral part of the future economic wealth of the metropolitan Sydney and NSW. It is anticipated that the Corridor will have a working population of 56,000 people by 2021. This will be an increase of 24,000 people over current levels and an increase in floor space from current existing floor space of 800,000 metres square to 2.5 million metres square of floor space. The future of the Corridor is about changing it from a low-density business park to a vibrant urban high technology employment centre taking advantage of the opportunities of additional public transport and new infrastructure. The area is central to the regional road network, surrounding the intersections of Lane Cove Road, Epping Road and the M2 tollway. Its regional accessibility will be greatly enhanced by the creation of three new rail stations (due for completion end 2008) within the corridor served by the Parramatta Rail Link. A regional cycleway is planned to traverse the corridor. Bus services currently enter the corridor from a variety of locations and include regional routes.

Future Macquarie Park Station Precinct

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 clans 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 and to the north-west of the Hawkesbury River Darginung was spoken.

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.

Aboriginal Sites within the NSROC Region

The following figure indicates Aboriginal sites across the region.

Council	Identified Aboriginal sites	Registered Aboriginal sites	New sites under investigation
North Sydney	60	60	2
Lane Cove	67	67	1
Hunters Hill	45	45	0
Ryde	62	50	0
Ku-ring-gai	69	67	0
Hornsby Shire	235	235	0
Willoughby	162	162	0
NSROC Region	701	686	3

Figure 7: Aboriginal Sites in the NSROC area, 2006

Preserving and Protecting Aboriginal Sites

NSROC councils have developed a range of strategies aimed at preserving the Aboriginal heritage of the area. Comprehensive registers of sites throughout the region provide information crucial to the management of the sites. 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 in the vicinity of an Aboriginal site.

In Hunters Hill there was one Aboriginal land claim on the area of Hunters Hill by the Darug Tribal Aboriginal Corporation for two small parcels of Crown Land, in the care and control and management of Council. The total area under claim was less than one hectare.

CASE STUDY

The Aboriginal Heritage Office

There are over 1000 sites of Aboriginal culture and heritage in Lane Cove, Manly, North Sydney, Warringah and Willoughby. The Aboriginal Heritage Office is a joint initiative of these councils, in a progressive move to protect Aboriginal Heritage in these areas.

Part of the work of the Aboriginal Heritage office is to monitor these Aboriginal Sites on a day-to-day basis and long term management reports are developed to ensure their preservation and protection.

Another key role of the Aboriginal Heritage Office is to give the Aboriginal people and non-Aboriginal people involved with these council areas an avenue of approach to discuss issues or concerns they may have. The office is in direct contact with the Metropolitan Local Aboriginal Land Council and its many resources.

An important part of the role is to communicate with schools and other groups, and teach children an ethos of understanding to appreciate the unique culture of the Aboriginal people.

In association with the local councils, talks, walks and activities are planned to enhance appreciation of Aboriginal culture in the wider community.

In Ryde there are over 62 identified Aboriginal sites. Some of the best known sites included the graves of Bennelong and other Aboriginal people buried in James Squires garden at Kissing Point. The Glades Bay Aboriginal Heritage Walk is another important area. The Draft Parramatta Foreshore Riverwalk Masterplan identifies significant indigenous heritage of the foreshore and suggests opportunities for interpretation through public art. In 2007, the City of Ryde is planning to submit grant proposals to funding bodies aimed at developing interpretive artworks along the foreshore to acknowledge and celebrate the Aboriginal heritage of the area.

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 goes towards 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.

"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," writes Geraldine O'Brien. "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, a factory, a railway, machinery, recreation reserve, cemetery or trees. There are many non-Aboriginal heritage items in the northern Sydney region due to its size, diversity and proximity to the nation's earliest settlement history.

Threats to Conserving Our Heritage

The major threat to the retention of heritage sites, buildings and locations is the on-going pressure of urban consolidation and redevelopment and occasionally neglect. Continuing development places 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

The northern Sydney region contains a number significant heritage areas and items. These include large parts of Hunters Hill which have been identified as a conservation area. The following is a summary of heritage areas and sites within each LGA.

North Sydney Council: contains **25** heritage areas with **869** items within those areas and around **3,000** within the LGA Protection is given by the North Sydney Local Environmental Plan, 2001. Of particular note are, Luna Park, Brett Whitley's former home and studio, BHP Tank Farm, the former Quarantine Boat Depot, the National Maritime Museum Shipyard and Graythwaite Estate.

Hunters Hill Council: Hunters Hill is identified as a conservation area by the National Trust, the Heritage Council of Australia and the Australian Heritage Commission. It has been on the register of the National Estate since 1978. It has **522** heritage items listed on Schedule 6 of the Local Environment Plan (LEP) and **588** contributory buildings built prior to 1928.

Lane Cove Council: contains **417** heritage sites with one conservation area. A conservation study has been drafted to assess the Northwood area as a potential second conservation area. A study has been commissioned into the possible addition of other areas and a Conservation Management Plan is being finalised on the heritage of the Lane Cove River estuary, in conjunction with Hunters Hill Council and funded by the NSW Government. This plan summarises the natural, aboriginal and cultural heritage since European settlement.

Willoughby City Council: contains **12** heritage conservation areas with **4,100** properties. Willoughby City Council has **200** listed items, which include **28** heritage items classified to be of State or Regional Significance.

Hornsby Shire Council: contains **814** heritage sites and **5** heritage conservation areas. It also has **9** items listed on the State Heritage Register and **23** items listed on the Register of the National Estate. The draft Local Environmental Plan (LEP) to implement the recommendations of the Hornsby Shire Heritage Review – Stage 3 has been submitted to the Department of Planning for gazettal. The draft LEP identifies an additional 25 heritage items within the Shire, and removes 5 items currently heritage listed where the items have been demolished or no longer warrant heritage listing. Hornsby Shire Council is progressing draft LEP amendments for the addition of 4 Heritage Conservation Areas covering Mt Errington, East Epping, Rosebank Avenue, and Wahroonga (North). The Department of Planning has advised that the additional Heritage Conservation Areas should be considered as part of Council's comprehensive LEP which is to be prepared in response to the State Government's planning reforms. Council's new LEP is due to be completed within five years.

Ku-ring-gai Council: contains **28** areas classified by the National Trust as Urban Conservation Areas. There are **700** items officially gazetted in Schedule 7 of the Planning Scheme Ordinance, with **600** items registered as locally significant. Eighteen items are included on the State Heritage Register. Many local residents cherish the heritage character of Ku-ring-gai and identify heritage preservation as a key value.

City of Ryde Council: contains **4** 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.

Working to Preserve Our Heritage

Councils in the NSROC region continue to work with the community in protecting, managing, maintaining and reviewing their 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 work together sharing data and resources to maximise the protection of heritage sites. For example a Conservation Management Plan has been prepared on the heritage of the Lane Cove River estuary by Lane Cove and Hunters Hill Councils. This plan will summarise the natural, Aboriginal and cultural heritage since European settlement. The northern Sydney councils also work hand in hand with community heritage groups whose research, activities and commitment continually proves to be invaluable.

CASE STUDY

Graythwaite Estate – includes one of the few remaining heritage listed Victorian mansions.

North Sydney Council – Saving Graythwaite Estate

Graythwaite is a 2.6 hectare estate that is the subject of a current court case in the NSW Supreme Court. The Estate features a heritage listed Victorian mansion that was built in the mid-19th century. This is one of only a few remaining in Sydney. The mansion is no longer in use and has fallen into disrepair in recent years. Graythwaite Estate was bequeathed to the Crown as a repatriation hospital in 1915 by Sir Thomas Dibbs. NSW Health applied to the Supreme Court early in 2006 to break the perpetual trust on the grounds this could no longer be fulfilled at Graythwaite. If NSW Health breaks the trust, the property may be sold and the proceeds used for a dedicated facility on another site. North Sydney Council is opposing this on the grounds that the trust can be fulfilled on the site of Graythwaite.

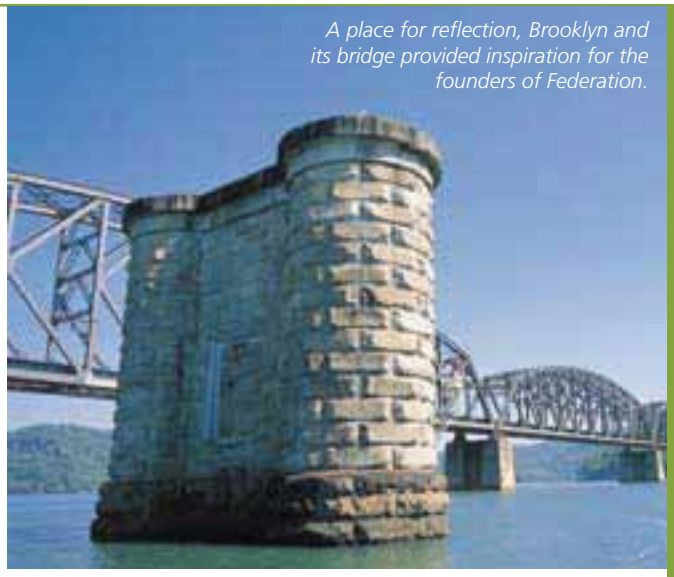
The hospital and respite facilities still in use at Graythwaite are currently managed and operated by Hope Healthcare. About one third of the site is currently in use as a hospital – the rest of the estate had been disused until 2000 when North Sydney Council reached agreement with Hope Healthcare to look after the gardens. Dedicated residents have met in the gardens each Sunday since November 2000 and have contributed about 5000 volunteer hours.

Willoughby City Council has received Australian Government's National Investment Initiative Grant of $454,545.00 for the restoration of the Walter Burley Griffin designed incinerator at Willoughby. The cost of restoration has been calculated at $1,303,000.00 and Willoughby City Council will fund the remaining $848,455.00.

The City of Ryde has allocated funds of $2.1 million to commence the building restoration of Brush Farm House in Eastwood and has recently been awarded $500k from the Federal Governments National Heritage Investment Initiative Program to undertake the restoration. Constructed circa 1820 by Gregory Blaxland, Brush Farm House is one of the most significant European buildings in the nation. Presently the upper level of the House is proposed for occupation by the NSW Department of Corrective Services (DCS), under licence. The DCS proposes to use this area of the House for training and meeting purposes. The remainder will be available for public use.

CASE STUDY

Hornsby Shire and Ku-ring-gai Councils' Centenary



A place for reflection, Brooklyn and its bridge provided inspiration for the founders of Federation.

The Shire of Hornsby was proclaimed on 7 March 1906; one of 134 new shires and municipalities formed throughout NSW. A provisional council was appointed, with five members drawn from local community groups. The first elected councillors for the shire met in the Hornsby School of Arts Building on 8 December 1906 and selected John Hunt as the first Shire President.

One hundred years later, Hornsby Shire Council is a strong and growing organisation, being one of the largest councils in Sydney, serving the needs of approximately 155,000 residents. Hornsby Shire Council has the special responsibility to conserve the unique character of its beautiful area while meeting the needs of residents today and in years to come. The challenge is to maintain a careful balance between the pressure of development and conserving the natural features of the Bushland Shire, combining heritage and innovation for a sustainable future.

In common with Hornsby, the Shire of Ku-ring-gai was first proclaimed on 7 March 1906 by Government Gazette, giving formality to an established tradition of community infrastructure building by local groups in the 19th century. Ku-ring-gai celebrated the event with a Centenary dinner for current and former councillors, a Mayoral soccer match between Hornsby Shire and Ku-ring-gai Councils, a photo competition, an essay competition for schools and a small grants program. A detailed historical publication of the Council and its impacts on shaping modern-day Ku-ring-gai is due to be published in November 2006.

URBAN PLANNING/TRANSPORT

Widespread media publicity has occurred over the growing concerns that the Greater Metropolitan Region of Sydney is facing traffic gridlock in the foreseeable future, initially at 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, the existing passenger rail system across all of Sydney. 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 a deterioration in local and regional air quality, contributes to global warming and indirectly impacts on water quality through urban run-off. Socially it creates issues of noise, public health, reduction of local amenity and community safety. Economically it constrains commerce. Through restricted mobility, it delays products and services in reaching markets and creates on-costs for consumers. Reducing traffic congestion therefore remains a key challenge for all levels of government and the community in the northern Sydney region.

The Impact of Traffic

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

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 9am and 3.30pm to 7pm. A characteristic of each of the roads is that they are 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 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 impact on local and regional traffic. Both of these infrastructure projects are occurring within the context of substantial residential and commercial growth associated with the development of Macquarie Park and the key urban centres of the region. In the longer term, the population of the Central Coast and Hunter Region are also likely continue to swell 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 that this growth will create additional pressure on the existing infrastructure. Overall, the evidence points to an inescapable move towards severe traffic congestion throughout the northern Sydney region in the medium future, and most likely gridlock during morning and evening peak hours. *(Noonan 2005)*

CASE STUDY

Lane Cove Council – The Lane Cove Tunnel Project

A significant undertaking by the State Government is the Lane Cove Tunnel project. The 3.6 kilometre long tunnel due to open in December 2006, is the final section of the Sydney Orbital network. The RTA feasibility study undertaken in 1999 assessed a project cost of $437 million covered by a $2.00 toll on 58,500 vehicles per day annual average daily trips (AADT) by 2016. By the time the contract was awarded in December 2003, project costs had increased to $1.1billion, still covered by a $2.00 toll (CPI adjusted from 1999).

In environmental terms, no assessment has been undertaken for changes in air quality beyond 2006. If, as a consequence of the Lane Cove Tunnel traffic on the lead in roads has to double existing volumes to achieve the traffic projections, amenity and air quality of the surface roads will rapidly deteriorate.

Decisions by the NSW Government to delay works on Epping Road is inconsistent with Lane Cove Council's call for the 24-hour bus lane between Mowbray Road and Parklands Avenue to operate initially as a T2 lane then a T3 lane during the ramp up period before reviewing the ability to operate as a 24 hour bus lane. Sydney Transit Authority has yet to advise what additional buses it proposes to include into the Epping Road corridor over the next two years.

Predicted traffic volume estimates will be benchmarked against actual volumes in subsequent reports.

The Lane Cove Tunnel under construction

Regional Transport Data

The most relevant data available for the region was collected in the traffic survey undertaken by the RTA as part of a three year repeating cycle covering the whole of the State 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, and divided by the number of days in that year.

The data demonstrated that, of the 19 arterial roads that exceeded this flow throughout all of the Greater Metropolitan Region, eight were in the NSROC region and another three were contiguous with it (i.e. as feeder or off-take roads). That is, half of the most congested traffic thoroughfares throughout Sydney were either in the region or skirted it. The maximum traffic counts recoded on the key roads of interest were:

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

(Noonan 2005)

For comparison purposes, certain roads on the southern side of the Harbour Bridge showed inordinate congestion as well. General Holmes Drive carried 134,000; Southern Cross Drive 119,000, Parramatta Road 89,000, and the Princes Highway 87,000. The M5 east was not functional when the AADT data was collected but now probably matches the worst of these. *(Noonan 2005)*

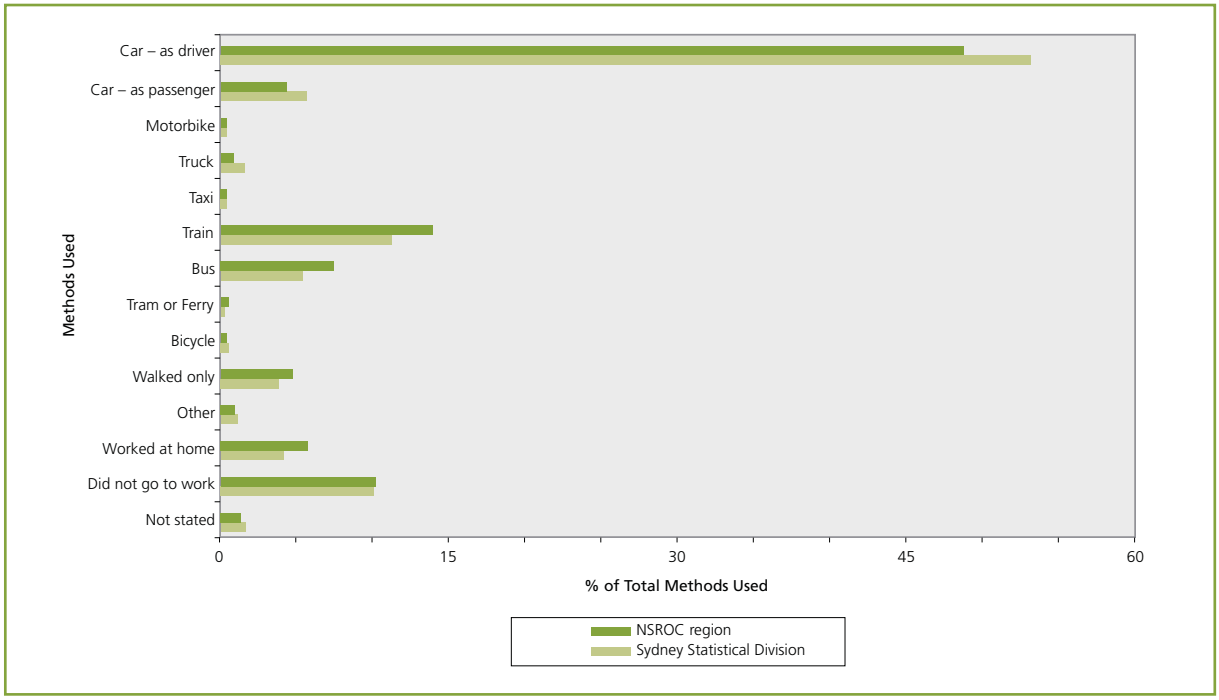


Figure 8: Mode of travel to work, in the NSROC region and the Sydney Statistical division, 2001

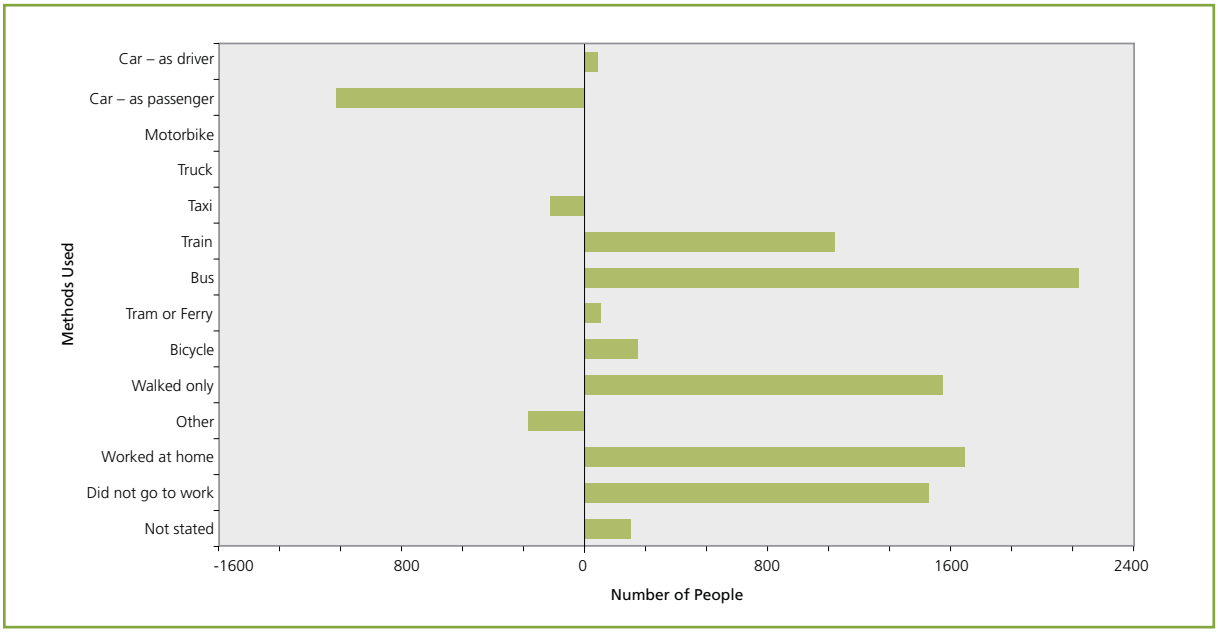


Figure 9: Change in mode of travel to work in the NSROC region, 1996 to 2001

Location	2002 Annual Average Daily Traffic	2005 Annual Average Daily Traffic
Pacific Highway, Hornsby, South of Edgeworth David Avenue	33,192	32,584
Pacific Highway, South Telegraph	63,557	64,050
Pacific Highway, Killara, South of Cecil Street	49,022	47,816
Pacific Highway, SH10 Chatswood, South of MR328, Boundary Street	47,169	62,700
Pacific Highway, SH10 Roseville, South of Clanville Road	57,398	57,310
Pacific Highway, SH10 Artarmon, South of SR2092, Mowbray Road	67,923	65,745
Falcon St, MR164 Crows Nest, West of West Street	27,417	26,745
Pacific Highway, SH10 North Sydney, South of SH10, Berry Street	21,321	22,748
Longueville Road, MR373 Lane Cove, West of SH10,Pacific Highway OVPS	62,694	62,734
Victoria Rd, MR165 Huntleys Point, East Of Huntleys Point Road	56,593	56,136
Concord Road, Concord, North of Correys Avenue	23,405	24,752
Church Street, at Ryde Bridge	78,796	83,932
Pittwater Road, Buffalo Creek Bridge	18,396	19,555
Victoria Road, West Ryde	58,335	58,238
Military Road, West of Watson Street	77,749	78,103
Epping Road, West of Longueville Road	75,485	75,865
Mowbray Road, West of Penshurst Street	17,407	17,977
Mowbray Road, East of Fitzsimmons Avenue	14,118	14,665
Centennial Avenue, South of Finlayson Street	20,160	18,663
Eastern Valley Way, at Scotts Creek Bridge	37,351	40,367
Boundary Street, West of Clermiston Avenue	37,819	34,704
Pennant Hills Road, South of Edward Road	61,105	61,798
F3, Wahroonga, South of Pennant Hills Road	38,912	38,912
Pennant Hills Road, South of Copeland Road	70,521	71,646

Figure 10: Daily traffic volumes at key locations in the NSROC region, 2002 and 2005

Council	Car Ownershp per capita 2005/06	Number of off-road vehicles per capita 2005/06
North Sydney	0.53	0.09
Lane Cove	0.54	0.09
Hunters Hill	0.47	0.09
Ryde	0.52	0.08
Ku-ring-gai	0.64	0.10
Hornsby Shire	0.44	0.08
Willoughby	0.53	0.10
NSROC	0.52	0.09

Figure 11: Car ownership per capita in the NSROC region, 2005/06

The NSROC councils are monitoring car ownership per capita in the region. The change in the number of off-road vehicles per capita may prove a useful indicator of changing consumer habits with residents selecting smaller vehicles as a result of petrol price increases and increased greenhouse emission concerns.

Meeting the Challenge of Sustainable Transport

The issue of increased private vehicle use in addition to a growing population is one of the major challenges 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. While major decisions regarding public transport infrastructure provision remain the domain of the state government, the NSROC councils work closely with the transport agencies to ensure that opportunities for active transport and public transport are maximised.

At present a number of train stations and bus interchanges in the region are being upgraded and a new heavy rail line is proposed which will run through north Sydney to the north west of Sydney. Bus reforms are also underway, however councils have not yet had a significant role in the development of the new bus contracts. NSROC has actively been pursuing the appointment of regional transport coordinators in Sydney to match the appointment of coordinators throughout the state. NSROC has recently learnt that two coordinators will be appointed, however they will initially be located in the western part of Sydney.

NSROC has also identified a number of key transport infrastructure requirements for the region and has commenced lobbying the state 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. NSROC has also, in conjunction with the Shore Regional Organisation of Councils (SHOROC), commenced the development of a Northern Sydney Land-use and Transport Plan which will cover both the NSROC and SHOROC regions (the NSROC councils plus Warringah, Pittwater, Mosman and Manly). The Plan will include the following elements:

- Examination of the contents of the SIS and identification of the key transport and land-use planning infrastructure requirements in order to implement the Metropolitan Strategy Sub-regional Plans;
- Review of previous regional studies and available data to provide a regional context;
- In consultation with individual Councils, document transport solutions, advising timeframes and funding regime to deliver improvements in the efficiency of existing public transport and roads infrastructure;
- Examination and reference to the Local Government Roads and Transport Strategy recently released by the ALGA for consideration at its national conference in August 2006.

The councils of NSROC have also enacted a number of local projects to further encourage the use of public transport and alternative methods of transport to the private motor car. 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.

Hornsby Shire Council has developed an Integrated Landuse and Transport Strategy and is making arrangements to put it on public exhibition. Residents of Hornsby can now find lots of safe places to ride their bikes in the new Hornsby Cycling Map. The map has been developed as part of a joint project by Council's Sustainable Action Committee and Bike North. The Hornsby Cycling Map grades routes from beginner to experienced levels. There are routes through parks, along roads as well as some more challenging terrain for the very experienced cyclist. The map provides recreational routes for weekend cyclists and helps residents do their bit for climate change and their health. Routes between main centres are rated for difficulty and show alternatives to using busy roads. Scenic bushland rides are also shown.

The City of Ryde is also preparing a Strategy for 'Integrating Land Use and Transport in the City of Ryde'. This Strategy will include analysis of the current lane use and transport context in the City of Ryde together with specific recommendations for each main centre and mode of travel. A draft Strategy is expected to be advertised for public consultation by the end of 2006. By 2011, the City of Ryde is aiming for a reduction in car use and increased use of sustainable modes, such as public transport, walking and cycling.

The North Sydney community has consistently identified the negative impacts of motor vehicles as a significant issue and become less tolerant of these impacts. The local community has required measures to alleviate the negative impacts and, additionally, it requires improved facilities for both pedestrians and cyclists. These new facilities often compete for road space, which is currently allocated to motor vehicles. Council acknowledges these major user groups and, through its policies and plans, works to provide balanced management of all road reservations within the Council area. After over two years of lobbying by Council and community groups, Roads Minister Eric Roozendaal announced on 14 June 2006 that new pedestrian and cyclist facilities would be provided at Falcon Street. These facilities will improve access following the construction of three new ramps to the Warringah Freeway as part of the Lane Cove Tunnel Project.

North Sydney Bike Plan – The Bike Plan sets out goals for improving cyclist amenities and safety in the Local Government Area over coming years and includes the addition of 18 bicycle routes. It is available for viewing in full at the North Sydney Council Customer Service Centre.

Cycling North Sydney Map – To aid cyclists travelling through North Sydney, Council has developed a brochure and map which is available to download from the website, or from Stanton Library and our Customer Service Centre. Council has also developed a series of walking maps which detail a 45 kilometre network of walks through North Sydney. Council has combined these with signage to encourage walking around the North Sydney area. Distance and times are included on the maps to promote alternatives to cars and encourage a healthy lifestyle. North Sydney Council has also been active in promoting car-sharing and the use of hybrid electric vehicles through purchasing a number for its own use. Many of the NSROC councils have been actively working with Sydney buses in promoting Park'n'Ride facilities.

Willoughby City Council has promoted walking to reduce car dependency and improve health through a trial of the 10,000 Steps program which encouraged staff to use the car less and exercise more. Willoughby

CASE STUDY

The University of NSW's solar car on display at the Smart Transport Show.

Willoughby City Council – Smart Transport Show

The Smart Transport Show promoted a range of sustainable transport options and support systems. Through information, entertainment and interactive displays of vehicles it highlighted the many benefits of the use of sustainable transport to the environment, economy, community and overall personal quality of life and health. The show was very popular with an estimated 30,000 people attending. Seven hundred pedometers were given away and each was accompanied by a pledge from the recipient to be more active in their daily lives.

This event was used to launch three Willoughby City Council Transport Access Guides (TAGs) and the pilot CouncilCab project. TAGs contain maps showing walking times and the location of bus stops with route numbers, train stations, bike parking, car share parking, disabled parking, taxi phones and other landmarks. By showing on the TAGs the coverage of an average 10 or 15 minute walk, residents are encouraged to choose walking for specific trip purposes.

CouncilCab is a pre-booked, demand responsive, multiple hire transport service, subsidised by Council. Two major trip generators will benefit from this transport service: Chatswood, being the regional centre for transport, shopping, office employment and the Royal North Shore Hospital complex.

The trial of the CouncilCab transport service operates out of peak hours, and if successful may be expanded to evenings and weekends. During the trial the patrons who will benefit most include seniors, less mobile residents, and residents without access to a car, because the service operates door-to-door within the whole local government area.

Uptake of the CouncilCab has reduced social isolation and allowed better access to health services.

City Council in conjunction with Bike North and Northern Sydney Area Health Services ran cycling proficiency courses to encourage community members to commute or use bicycles for short trips.

In response to increased single person vehicle use and ageing populations, Ku-ring-gai and Hornsby Shire Councils are trialling a new shuttle bus service for people who are less mobile. The shuttle provides door-to-door transport from Berowra to St Ives, stopping in between at Mount Colah, Hornsby Shopping Centre, Hornsby Hospital and Turramurra. Passengers can also request other destinations on the route.

The trial of the shuttle bus service will operate on Fridays and target frail, aged and disabled people and their carers who find it hard to use public transport. This bus will help them regain some of their freedom. Passengers are helped on and off the wheelchair accessible bus, however they must be able to manage by themselves once they reach their destination. The service is a new initiative of Accessible Bridge Services, a consortium of community transport providers in the northern Sydney region.

WASTE MANAGEMENT

Increasingly waste is being viewed as a resource rather than a liability. Waste has the potential to be recycled, re-used or used to generate energy. The manner in which it is managed impacts on 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 pollution as a result of methane emissions from landfill sites. Also, there is only a finite amount of land that can be used for landfill, therefore it is extremely important to continue to reduce waste.

Lane Cove Council and Willoughby Council – E-waste Collection

Obsolete electronic goods, or 'e-waste' is one of the fastest growing waste types and the problem of e-waste is global. New electronic technology is constantly being developed and Australians have a reputation of rapidly adopting new technology, from VCRs to DVD players to portable mp3 players. This uptake and the increasing speed with which this technology reaches obsolescence has resulted in large quantities of e-waste requiring disposal.

Apart from the physical volume of obsolete e-waste requiring disposal another concern to contend with is the presence of various hazardous chemicals contained within e-waste which could leach into the environment.

Lane Cove Council and Willoughby Council have responded to this waste challenge by organising a joint e-waste collection weekend for their residents. The Artarmon works depot was utilised with a driveway service setup allowing residents to 'drive-through' and have the goods removed from their car by Council staff.

Over the weekend more than 3983 e-waste items were received. The total volume collected over the weekend was 28.9 tonnes of e-waste with over 90 per cent of this volume being recycled and importantly dangerous chemical treated appropriately. This represents a significant diversion of waste from landfill and the prevention of dangerous chemicals leaching into our environment.

CASE STUDY

Waste Issues

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

- Co-operation and participation of the community in continuing to recycle materials without contaminating the respective waste streams;
- Higher cost in disposal of waste materials due to 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;
- Declining number of land fill sites.

Solid Waste Disposal and Recycling

In 2005/06 residents of the NSROC region generated 118,394 tonnes of material which went to landfill. A further 91,092 tonnes of material was recovered through recycling systems and an additional average of 58 kilograms of green waste was recycled for each person in the region. In 2005/06 the amount of material diverted from landfill through recycling and green waste collections was 218 kilograms per person.

In total more waste was collected in 2005/06 than in previous years reflecting the growing population of the NSROC region. However the volume and percentage of waste that is being recycled has once again increased considerably. The total landfill has increased by 807 tonnes in the region since 2004/05 and the total of resources recycled has increased by 25,918 tonnes.

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	10,132	9,138	166	150	16
Lane Cove	7,170	5,718	222	177	46
Hunters Hill	3,401	1,607	242	141	14
Ryde	30,123	11,140	303	112	11
Ku-ring-gai	20,519	31,154	190	288	143
Hornsby Shire	32,324	32,832	184	208	91
Willoughby	14,725	13,843	230	132	85
NSROC	118,394	91,092	220	160	58
Total Greenhouse Gas Emissions saved in NSROC region resulting from recycling (using DEC environmental calculator)			**45,774 tonnes of $C0_2$**		

Figure 12: The division of landfill and recycled waste by council within the NSROC region, 2005/06

Responding to Waste Issues

NSROC Councils are actively increasing their recycling facilities, reviewing their processes and looking at new technologies to maximise the effectiveness of their waste management services. Councils in the NSROC region also work closely with the community to increase awareness amongst 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 within schools and in the community to encourage minimum waste consumption and maximum recycling.

To reduce waste to landfill and to encourage residents to reuse and recycle maximise recycling, City of Ryde introduced a new waste and recycling collection service in May 2006. Householders received three new bins – a 140 litre garbage bin, 240 litre recycling bin and a 240 litre garden vegetable bin, and residents in multi unit dwellings were issued with garbage bins to share.

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 the circumstances applying in a local area, 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 impacting more on the community and 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 currently stand out, namely: barking dogs; air conditioners; swimming pool pumps; early morning garbage trucks; and less frequently, improperly set building intruder 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 Conservation (DEC) for all of Sydney.

NSROC is also impacted by aircraft noise, but there is evidence in recent months that the 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 the future. It should be noted that in the aircraft noise data provided below that the number of complainants was significantly lower than the number of complaints.

Complaints reporting is one subset of the noise concerns. Road traffic and rail can also be major causes, especially when heavy vehicles apply their engine brakes or a motorcycle with a lower quality muffler accelerates. 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.

Council	Barking dogs	A/C	Building sites/ construction	Licensed premises	Garbage trucks	House & car alarms	Domestic noise source	Aircraft noise	Other	Total
North Sydney	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9	n/a	537*
Lane Cove	6	2	n/a	n/a	n/a	n/a	15	47	n/a	70
Hunters Hill	72	12	50	6	1	2	0	64	n/a	207
Ryde	24	13	10	0	5	7	25	303	n/a	387
Ku-ring-gai	231	35	40	1	30	7	61	74	n/a	479
Hornsby Shire	298	23	19	0	7	3	64	91	17	522
Willoughby	144	55	65	8	7	12	25	19	28	363
NSROC	775	140	184	15	50	31	175	560	45	1,975

Figure 13: Number of complaints due to noise within the NSROC region 2005/06

** North Sydney had a total of 537 complaints - however the data did not detail the cause of complaints.*

Responding to Noise Complaints

The northern Sydney councils play a key role in addressing noise complaints through the actions of Environmental Health Officers and Rangers who have the capacity to take action under various Acts and Regulations. This role is shared with the DEC, the police, the NSW Maritime Authority and the Roads and Traffic Authority. The most common source of domestic noise complaints continues to be barking dogs.

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 assist as well. 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 the buffers provided by beneficial natural assets and introduce features that amplify sounds that are normal to an area. Exactly how and where the greatest sources of noise will occur in the future across the region are 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, increasing attention is being paid to sensible site planning, building layouts and the use of noise reducing insulation in approving developments. Similarly in long term infrastructure planning the nomination of transport corridors for traffic management can take account of the impacts on residents within the impact zone, and noise-barriers installed at the most vulnerable locations.

ENERGY CONSUMPTION

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

Energy use produces a significant amount of greenhouse gas emissions in Australia. The majority of energy is produced through the combustion of non-renewable fossil fuels which creates significant amounts of greenhouse gases. Although renewable sources of electricity are now being created 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 the commercial and retail sectors and changing lifestyles, have all intensified energy demand. As with the rest of the country, the increasing popularity of home air-conditioners is likely to continue, and if recent trends persist, these will also become larger and more sophisticated. There is also a strong trend towards ownership of more energy consuming devices such as televisions, phones, stereos and fridges.

While in part these changes 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)*

The Extent of Energy Use

Energy consumption patterns by sources in all Australian capital cities have shown a marked increase over the past decade, and even over the past five years. This appears to exceed both the population growth in that period and the increase in commercial activity that has been associated with a buoyant economy. For Sydney, which receives very 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 strategic planning initiatives of NSROC because of its low industrial base, shows that there has also been an increasing trend in the ratio of energy consumed per capita. 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-impacted world.

One feature of Sydney's consumption is the change that occurred in the late 1990s where the maximum winter demand was for the first time overshadowed by a new summer maximum demand. Previously, electric heating had driven the heaviest load demands across the city, but the newfound popularity of residential and commercial air-conditioners began to make an impact.

The Street Lighting Improvement Program

Background

Twenty-nine councils in metropolitan Sydney, the Central Coast and the Hunter region have worked closely together since 2003 under the Street Lighting Improvement Program. The Program was established to achieve reforms to serious longstanding deficiencies in EnergyAustralia's provision of public lighting services. All NSROC councils except Hunters Hill are in the Program.

Through the Program, Councils are working together to update current poor technology selection, inefficient practices and lengthy delays in completing repairs, modifications and additions.

Program efforts to date have resulted in:

- Successfully challenging EnergyAustralia's proposed 70 per cent price increase in 2004 and 2005, resulting in total costs to councils that are $27 million lower than proposed, and a $30 million requirement on EnergyAustralia to remove obsolete lighting over the next few years;
- Securing an EnergyAustralia agreement to correct a number of obsolete, inefficient and costly practices;
- Securing EnergyAustralia agreement to install a large-scale trial of new energy efficient lights;

- Securing a NSW Public Lighting Code that establishes minimum service standards and council say over technology choice; and
- Securing a $4.2 million grant offer from the NSW Energy Savings Fund.

Energy Savings Fund Grant

In March 2006, the Premier announced a $4.2 million grant offer under the NSW Energy Savings Fund to the 29 SLI Program councils to install energy saving street lighting, reducing greenhouse gas emissions by about 120,000 tonnes CO2 by 2016.

The grant involves replacing some 40,000 lights on both main and residential roads. On main roads, the grant enables councils to retire early about 27,000 inefficient, but still working, mercury vapour lights. These will be replaced with high pressure sodium lights, a technology widely used elsewhere, reducing energy consumption and greenhouse emissions by about 35 per cent. On residential roads, the grant enables councils to use next-generation T5 and/or compact fluorescent lights instead of the mercury vapour lights that EnergyAustralia is planning to install in large numbers, delivering energy and greenhouse savings of about 50 per cent. On both main and residential roads, the new lights should also result in lower overall costs, fewer outages and a significant drop in light pollution to the night sky.

The exact dollar value and environmental benefits of the grant offer to each council in NSROC will depend both on the street lighting inventory and the outcomes of detailed negotiations with EnergyAustralia, which are ongoing.

NSW Public Lighting Code

On 1 January 2006, after three years of work spearheaded by SLI Program councils, NSW adopted a Public Lighting Code. Under the Code, service providers are now required to undertake preventive maintenance, conduct timely spot repairs, improve the information provided to councils, consult councils on lighting choice, institute a formal management plan, and report their performance against the management plan and the performance targets established in the Code.

Of most importance environmentally is the onus on EnergyAustralia and other distributors to consult with councils on standard lighting choices. This allows issues such as energy efficiency, light pollution, waste disposal, aesthetics and other environmental priorities to be given far greater attention in the future.

CASE STUDY

CASE STUDY

One of nine Toyota Prius hybrid vehicles used by the City of Ryde.

City of Ryde – Energy Savings and Greenhouse Gas Reduction

The City of Ryde has made significant progress towards saving energy and reducing greenhouse gas emissions in the 2005/06 financial year. The City of Ryde joined ICLEI's Cities for Climate Protection (CCP) Program on the 1st March 2005 and on the 6th of December adopted targets of 20 per cent reduction in corporate greenhouse gas emissions by 2012 from 2003 levels and a 20 per cent per capita reduction in community greenhouse gas emissions by 2010 compared to 2001 levels.

In order to assist with the development of a draft Local Greenhouse Reduction Action Plan, and assist with the implementation of other energy and water saving measures, a City of Ryde Water and Energy Savings Team (CORWEST) was formulated in early February 2006.

Achievements of the City of Ryde in 2005/06 include:

- A draft Local Greenhouse Reduction Action Plan (to satisfy Milestone 3 of the CCP Program) has been prepared;
- Engagement of consultants to assist with preparation of an Energy Savings Action Plan;
- Reducing the hours of operation of air conditioning in the Civic Centre and other community buildings;
- Installing ZIP timers in various community halls;
- Installing more efficient lighting in the Civic Centre and reducing the number of lights in each fitting;
- Introduction of a revised Motor Vehicle Policy with economic incentives for utilising lower fuel consumption vehicles;
- Commencement of a new Waste Contract with increased recycling capacity and greenwaste collection.

Council is currently working to finalise Local Greenhouse Gas Reduction Action Plan and Energy Savings Action Plans which will result in even greater greenhouse gas savings in the future.

Council	Residential MWh 2005/2006	Number of Customers	Non-Residential MWh 2005/2006	Number of Customers
Hornsby Shire	462,803	51,285	278,286	4,865
Ku-ring-gai	442,306	39,275	210,661	3,567
Willoughby	150,565	19,245	294,639	3,700
North Sydney	176,965	32,557	574,708	7,412
Lane Cove	131,615	17,545	358,140	2,106
Hunters Hill	41,907	3,901	16,778	255
Ryde	298,523	42,798	598,522	4,447

Figure 14: Energy consumption within the NSROC region by residential and non-residential customers, 2005/06 *(Energy Australia 2005/06)*

Responding to Energy Demand and Consumption

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

While there is very strong support for the introduction of the Building Sustainability Index (BASIX) energy controls by the NSROC councils, there is not a clear picture yet on how effectively or comprehensively the 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.

Councils above a certain size will also be required to develop Energy Savings Plans by 2006, and work is already underway to audit energy use in council facilities and minimise consumption through purchasing more efficient machinery and changing work habits.

Various initiatives have been undertaken by the NSROC members to reduce energy demand across the region as part of their move towards 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 saving in consumption over the long-term.

Willoughby City Council has received a grant from the NSW Government's Energy Savings Fund to install a co-generation system at Willoughby Leisure Centre. A co-generation system will use gas turbine to generate electricity and recover the waste heat from this process to heat pool water and provide domestic hot water for amenities. The co-generation system will reduce peak demand on the electricity grid and reduce greenhouse gas emissions and running costs.

WATER CONSUMPTION

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

Pressure on Water Resources

Sydney's water resources are under pressure from the increasing demand for, and consumption of, town water supplies by the Sydney community. 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. While it is difficult to determine the exact nature of on-going climate change, there is a distinct possibility that historical rainfall patterns will not be repeated and that Sydney will instead have more prolonged periods of dry weather and less annual rainfall.

Regardless of the exact repercussions of our intensive use and consumption of Sydney's water resources, the conservation, protection and management of these resources within the community will not only benefit the environment in terms of greater environmental flows but will also save consumers money due to reduced use.

Water Consumption in the Region

The current rates of average annual water consumption per property vary between NSROC areas. Some have been consistently below Sydney's average in recent years, while others have been significantly above average. The northern Sydney region consumed a total of approximately 56 million kilolitres of water during 2005/6 with the average house using approx 251 kilolitres per year.

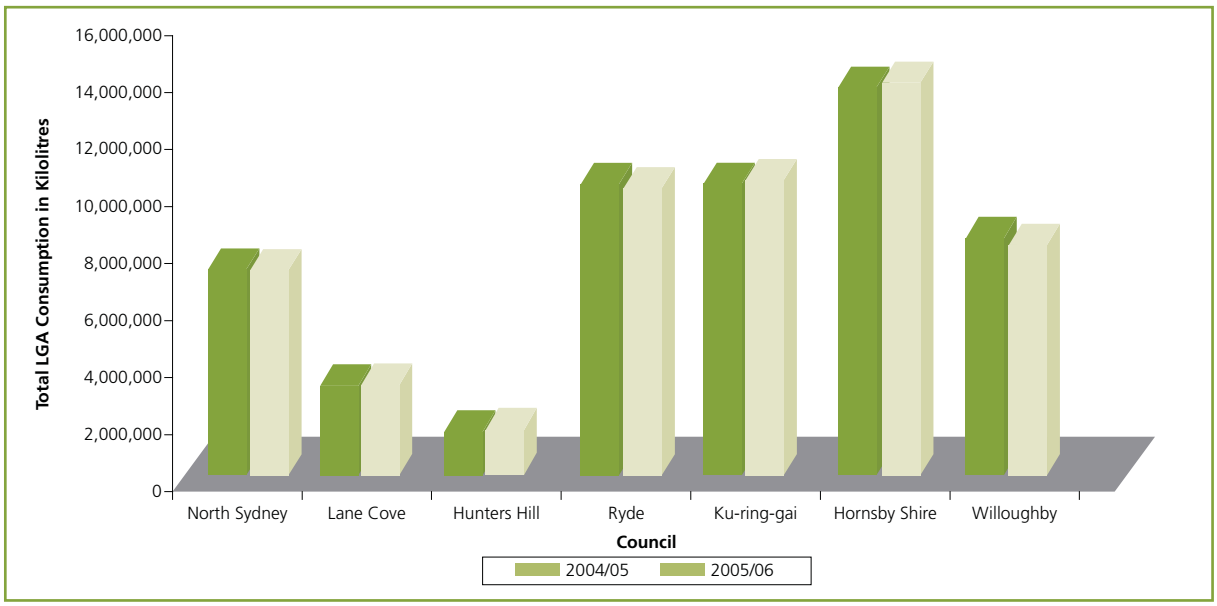


Figure 15: Total water consumption by LGA in NSROC Region, 2004/05 - 2005/06

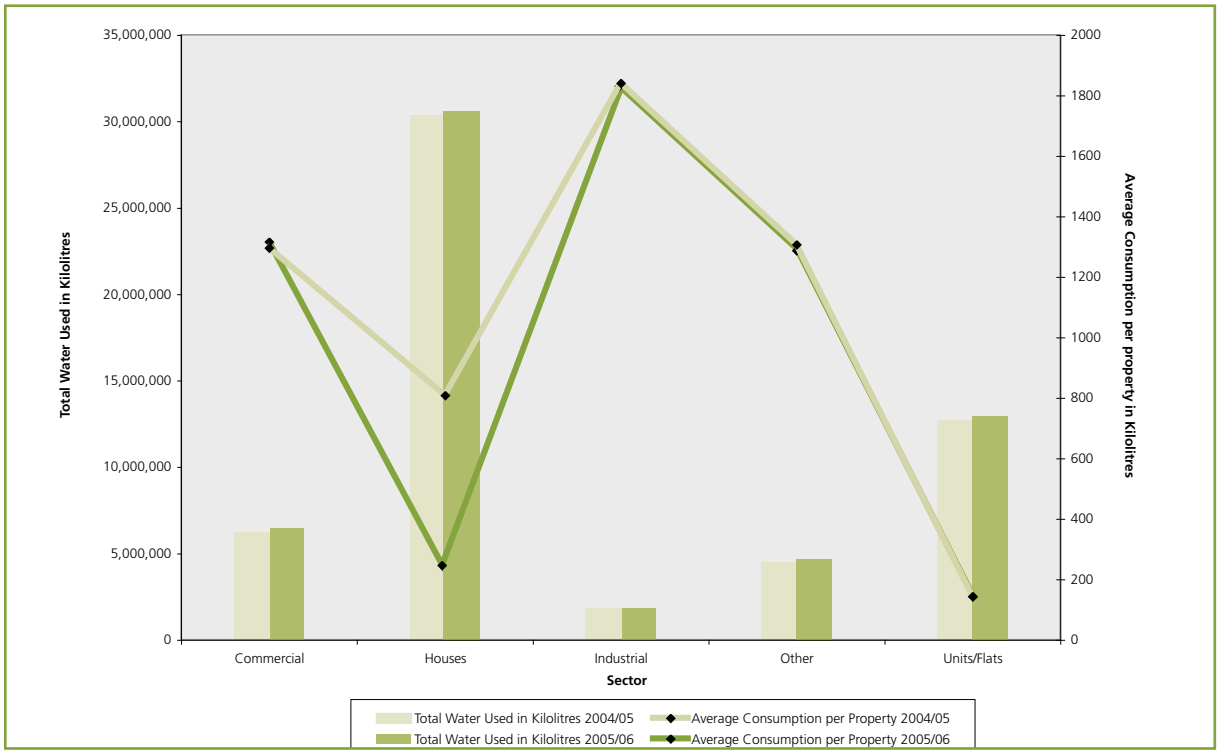


Figure 16: Water Consumption across the NSROC region, 2004/05 - 2005/06

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

Gordon Golf Course: to benefit from the water-saving sewer mine project.

CASE STUDY

Ku-ring-gai Council – water-saving sewer mine project

Ku-ring-gai Council won an $830,000 State Government grant for an innovative sewer mining and storm water re-use project providing around 98 per cent of the water needs of the Council-owned golf course. It may also supply water to nearby Killara golf course. The project will use sewer mining technology to treat waste water from three sewage pipes underneath Gordon golf course, storing it in large tanks around the courses for irrigation. The project will also re-use storm water from nearby areas by capturing and treating it. It is expected that the project will re-use up to 140,000 kilolitres of water each year – enough to fill 140 Olympic-size swimming pools. This is water which otherwise contributes to the erosion of local creeks and bush land. Apart from saving water, storm water recycling also reduces nutrients entering bush land, reduces sewerage discharges to North Head Sewage Treatment Plant and helps Council cut its water bills.

Meeting the Water Challenge

All Councils have initiated programs to reduce their own water consumption and to educate and assist the community in water conservation measures. Measures include encouraging the installation of water tanks, dual flush toilets, water saving shower heads, and planting of native gardens which require less watering. Significant improvements in water consumption have been achieved from these measures and the introduction of water restrictions across Sydney.

All councils were required to develop water savings 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. Some examples of the initiatives that NSROC members have adopted to promote water conservation include:

- All the NSROC councils are members of the Sydney Water Every Drop Counts Program, auditing council facilities and developing plans to achieve tangible water savings.
- Hornsby Shire, North Sydney, Willoughby City and Hunters Hill Councils are members of the International Council of Local Environmental Initiatives (ICLEI) Water Campaign to achieve tangible targets in the sustainable use of fresh water.
- City of Ryde, Willoughby City and Hunters Hill Councils have actively encouraged the installation of rainwater tanks by residents, and in Ryde, Council has also been actively involved in identifying and fixing leaks throughout all of its facilities and is progressively installing waterless urinals and flow reducers/ restrictors on all showerheads and taps.
- Willoughby City Council will achieve water savings through centralised control systems and moisture sensors for the irrigation of sports fields, use of flow controls in public amenities taps and large stormwater reuse projects in Chatswood CBD and on sports fields. Planned measures under the Water Savings Action Plan will result in 63 mega litres of potable water savings per year.
- Hornsby Shire Council has implemented water conservation measures in all its buildings and parks to achieve 20 per cent water savings per year, and installed a stormwater reuse systems at three parks and its nursery in Pennant Hills. The Council has achieved Milestone 4 of the ICLEI Water Campaign for both corporate and community programs. The Hornsby Water Management Action Plan (The Plan) was produced in September 2004. The Plan has been initiated and developed by Council's involvement in the ICLEI. It serves as a framework for Council and the community to better understand and prioritise the actions required to effectively manage water resources. It integrates all of Council's programs dealing with improving water quality and water consumption. The Plan comes at a time when the country is plagued

by continuous drought with level 3 water restrictions. It also satisfies the requirement of the Metropolitan Water Plan 2004 released by the NSW State Government. Council has already achieved its set goal of 20 per cent corporate water reduction (7,800 kilolitres) and community consumption reduction of 18 per cent (900,000 kilolitres) in 2005, and will continue to monitor this progress.

- Lane Cove Council has revised its 'Rainwater Tank Policy' to encourage the installation of water tanks in the community. The simplified policy now allows the installation of tanks up to 10,000 litres without having to submit a development application. The Council itself is providing leadership with the installation of rainwater tanks at the Councils Administration Building. These tanks capture roof water for use on surrounding gardens with connection to internal amenities to provide flush water planned.
- North Sydney Council has received state funding for a Stormwater re-use project which will see North Sydney Council, Cammeray Golf Club and North Sydney Bowling Club harness 90 million litres of water which will be treated before being used for irrigation at the golf course and number of parks in the North Sydney Council area including North Sydney Oval. Since 2002 North Sydney Council has significantly reduced its water consumption in its top ten water consuming sites by 40 per cent. Despite this great achievement the Water Saving Action Plan identifies additional areas of improvement including:
  - Stormwater re-use and treatment for irrigation at North Sydney Oval, Primrose Park, Tunks Park and Bon Andrews Oval;
  - Installation of water tanks to store water for irrigation and connection to bathroom cistern (a Community Water Grant has been submitted for Crows Nest Community Centre);
  - Installation of dual flush controls to cisterns namely at North Sydney Oval, Crows Nest Community Centre and Council Parks;
  - Installation of water restrictors to hot and cold water taps;
  - Installation of low flow showerheads;
  - Installation of waterless urinals;
  - Ensure systems and equipment remain water efficient by undertaking regular maintenance.

CASE STUDY

City of Ryde – Water Savings at Ryde Aquatic and Leisure Centre

The Ryde Aquatic Leisure Centre (RALC) is one of the largest aquatic centres in Sydney, not surprisingly it is also the City of Ryde's single largest user of water, using over 40,500 kilolitres of water each year. Council submitted an application in October 2005 for Round One of the DEUS Water Savings Fund for various significant water savings measures at the Ryde Aquatic Leisure Centre and was successful in being awarded $431,841 to execute the following water saving measures over the next two years:

- Rainwater harvesting – the collection of rainwater from guttering stored in two 107 kilolitre tanks. This will cost $134,860 with a saving of 5,000 kilolitres water saved per annum.
- Backwash Reuse – this is capable of reusing approximately 95 per cent of the 5881 kilolitres of water used to backwash pool filters which is currently sent to sewer. The total project cost is $202,956 total with a saving of 5,587 kilolitres water saved per annum.
- Conversion from an Ozone to UV treatment system – this uses considerably less water and energy than the Ozone system. The total cost is $201,961 with savings of 16,970 kilolitres of water and 166,615 kilowatt hours of energy per annum.

Overall Water/Energy Savings Benefits of this Project

Apart from savings of over 27,500 kilolitres of water per year (over 67 per cent of current usage) this project will also save over 166 615 kilowatt hours of electricity per year.

Overall Project Cost and Payback

This gives an overall project cost of $701,841 for annual savings of $80,529 and the City of Ryde has committed $270,000 of this cost to complete the projects. Estimated payback period for the City of Ryde is around 3.3 years for the money it has committed to the projects.

- Ku-ring-gai Council has received substantial funding to establish a stormwater harvesting facility at St Ives which would serve as a model for application in other parts of the region. Ku-ring-gai Council has developed a combined Water and Energy Action Plan. During the development of the plan, a greater number of Council sites were identified and audited so as to provide information to inform the development of Council's capital works programs and to provide supplementary information to the greenhouse action plan. A total of 38 sites have been included.
- In March 2006 Hunter's Hill Council undertook the NSW Department Energy Utilities and Sustainability's directive to create a 'Water Saving Action Plan'. This applies to the top-10 water using council assets. As determined through the plan, simple measures such as installation of water saving devices, Council could help to save up to 1,600,000 litres annually compared to current use. Hunter's Hill Council has allocated council funding to assist in the on-ground implementation of this plan. Works will commence late 2006.

COMMUNITY HEALTH

Increasingly councils are becoming involved in community health activities in recognition of the necessity to provide a comprehensive range of services that benefit all elements of their communities. Particular attention is paid to the more vulnerable sectors of society 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 amongst its residents.

Community Health Issues

The population in the northern Sydney region is steadily increasing 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 increased pollutants in the environment caused by increased traffic, energy consumption and waste generation. Pressures on community health include life-style related diseases such as obesity, stress and smoking-related diseases (declining in real terms).

The Environment and Health

It is difficult to demonstrate direct causality between environmental impacts and community health in a broad context. While specific pollution incidences such as chemical spills, exposure to asbestos, and heavy metal poisoning can have significant community health impacts, many health impacts are only discernable over time and after considerable or repetitive exposure. Councils are not frontline agencies in managing community health. However, they do have a significant role in managing the environment so it minimises the impacts on the community, and in working with health agencies and services to educate the community on health related issues.

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 health of their communities. One indicator identified by the NSROC councils is the number of asthma cases reported in the region as an indicator of air quality, as it is generally perceived that there is a direct link between the two.

	Total %			Female %			Male %		
	2002	2003	2004	2002	2003	2004	2002	2003	2004
Hornsby Shire	19.7	9.6	10.5	10.3	10.3	17.1	15.3	9.9	13.3
Hunters Hill	0	12.5	0	0	0	0	0	6.7	0
Ku-ring-gai	10.4	8.1	7.7	5.7	15.9	8.3	8.4	11.3	8
Lane Cove	14.3	15.8	11.8	8.3	0	16.7	10.5	8.6	13
North Sydney	8	10.9	0	0	4.5	0	4.7	8.8	0
Ryde	10.9	15	18.5	0	2.9	10.5	5.8	10.6	15.2
Willoughby	14.8	16.2	14.3	12	4.3	7.7	13.5	11.7	11.8
NSROC	**13.8**	**11.8**	**10.3**	**6.4**	**7.8**	**11.6**	**10.3**	**10.2**	**10.8**

Figure 17: Prevalence of Asthma in the community, 2002 to 2004

(Strategic Research and Development Branch, Centre for Chronic Disease Prevention and Health Advancement, NSW Health Department.)

CASE STUDY

North Sydney Council – Walking Buses

The school community of North Sydney Demonstration School has taken a positive step towards increasing the physical activity of children and reducing the traffic congestion near the school with the establishment of a walking bus program.

Two new walking routes were established for Wollstonecraft and Waverton Walking Buses. McMahons Point Walking Bus has been walking to school for the past three years and is an established and very successful Walking Bus. New walking buses for North Sydney Demonstration School were modelled on this successful Walking Bus. As suggested by members of the existing McMahons Point Walking Bus, the project needed to have a strong community ownership if the buses were to continue functioning, in the long-term, without outside support. If the community had strong ownership of their own Walking Bus in their local suburb, issues of liability for Council would also be highly decreased.

Each Bus had at least one but sometimes two parents participating in the Bus's maiden voyage. It was a great opportunity for participants to meet other parents from the neighbourhood and to discuss logistics, swap phone numbers, discuss parent availability and decide upon Walking Bus frequency.

StarWalker! Participation Certificates were awarded by the school principal, Jennie Fogarty, to each Walking Bus participant at the North Sydney Demonstration School Assembly. This was followed by a road safety talk and the distribution of road safety promotional materials. A light healthy snack was provided for Walking Bus participants before students broke off into their individual classes. The program received media coverage in the local paper *The Mosman Daily.*

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. The councils in NSROC often take a coordination, support and referral role in the provision of services to the elderly, disabled and mentally ill. For instance Hornsby Shire Council has an Over 55s Team, run by Community Services. One key objective is to promote 'Positive Healthy Ageing'. To meet this objective the staff conducted a Health Seminar Day, focusing on specific health issues applicable to Over 55s. The topics included:

- The importance of exercise and nutrition
- Falls Prevention
- Yoga for Over 55s
- 10,000 Steps Program
- Heartmoves

Attention is paid to both health issues in the home and in the workplace. Councils provide staff and premises for some health programs and activities in full. For instance, Lane Cove Council provides seniors with access to regular seminars covering topics such as Dementia & Memory, Complementary Medicines, Diabetes and Skin Cancer safety.

Hunter's Hill Council has supported the establishment of gentle exercise classes and a table tennis club for seniors citizens. There has also been a focus on upgrading children's playgrounds across the municipality, with new

equipment in almost half of playgrounds over the last three years.

North Sydney Council undertook a variety of programs and actions to encourage a healthy community including:

- Lobbying for retention of Cremorne Community Mental Health Centre services. Consultations and campaigns for Cremorne Community Mental Health services took place in 2005. NSW Health agreed to continue funding in the medium term.
- Delivering a children's obesity program. Application submitted December 2005. $22,000 in funding received from Local Government & Shires Association of NSW for project 'Putting Healthy Options On The Menu At Ripples'.
- The implementation of the 'Safe Spaces' program for Lesbian, Gay, Bi-sexual or Transgender Community. The program aims to tackle violence against members of the Lesbian, Gay, Bi-sexual or transgender community. Various amenities such as bars and cafes that agree to take part display a sticker on the door and agree to be a safe refuge. Participation in the program continued in 2005/06.

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.

Programs of note in Ryde have included the 2005 Harmony Festival, Battle of the Bands, seminars on men's health, parenting, family law, carers, and children with a disability, the Lantern Walk for Ribbon Day, Bike Week activities and skateboard competitions, a return to sport program for the over 35s, an award winning immunisation program and various Ryde Safe Community Projects such as drug action and crime prevention to name a few.

Willoughby City Council implements a number of initiatives to improve the health and wellbeing of the community. These include a range of services from meals on wheels, shopping services, social programs to combat social isolation and associated depression; facilitation and promotion physical exercise; free immunisation clinics and programs like the Linen Service which assist with infection control and hygiene in the home as well as social interaction.

Councils also assist in the management and funding of a number of community organisations for example Ku-ring-gai Council's award winning 'Active Ku-ring-gai' program provides the community with a variety of activities for residents to stay fit and healthy including tennis competitions, Pilates and social walks. The City of Ryde has supported over 46 community organisations with community grants and/or facilities. These included Christian Community Aid, West Ryde Community Aid, North Ryde Community Aid, the West Ryde Neighbourhood Centre, Eastwood Women's Rest Centre, West Ryde Neighbourhood Children's Centre, Eastwood Occasional Child Care Centre Pre-schools, Early Childhood Centres and Senior Citizen Centres.

3 Bushland and Biodiversity

PHOTO: LES IRWIG

The NSROC region is over 680 square kilometres and includes over 7,000 hectares of bushland. Some of the largest tracts of bushland in the Sydney metropolitan area are located in the NSROC region. The condition and management of bushland is of particular importance to the residents in these areas, 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 the protection of 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 Murramurra 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.

CASE STUDY

North Sydney Council – Native Haven Program

North Sydney Council's Native Haven Program offers assistance to residents who wish to help the environment by using local indigenous plants in their garden. Native plants, apart from looking good and being environmentally friendly, serve many useful purposes. They provide food, shelter and nesting materials for our native animals. North Sydney, whilst densely populated by humans, is still home to many native animals.

North Sydney has only 50 hectares of bushland remaining; a small percentage of what was once abundant with native fauna and flora. Each garden that replaces exotic and hybrid plants with native plants, increases the resources available to our wildlife, effectively increasing the area of bushland. By eliminating weeds with seeds, fruits and propagules that are easily transported from gardens into bushland, less resources are required by Council to restore degraded bushland.

North Sydney Council won an Australian Government Envirofund grant to involve local residents in caring for Cremorne Point bushland – the project is called 'Adopt a Plot'. Residents are offered a unique opportunity to help qualified bush regenerators care for a 'plot' next to their home. This requires a commitment of three hours a month. Bush regeneration staff help residents identify weeds, learn the best removal techniques, and how to control weeds. Alternatively, residents can donate $720 in lieu of doing bush regeneration work. Their donation is matched by the Envirofund Grant to fund four hours bushcare work on a plot next to their home.

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 impacted severely on bushland areas and on biodiversity in the Sydney metropolitan area with only around 12 per cent of the original bushland remaining. The Metropolitan Strategy currently being developed by the state government has recognised biodiversity conservation as one of the key environmental challenges to be faced. This is critical in the planning for continued urban growth to provide for Sydney's expanding population.

The *Threatened Species Conservation Act 1995* protects all threatened plants and animals native to NSW (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 impacts 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.

Urban development has impacted severely on bushland areas and on biodiversity in the Sydney metropolitan area with only around 12 per cent of the original bushland remaining.

Existing Bushland in the Region

Most of the bushland areas in the NSROC region can be found in the northern part of the region which includes many relatively undisturbed tracts protected by national park status. Most vegetation found in this region is confined to nutrient poor sandstone-derived soils in steeply sloping areas and gully lines. However, remnants of plateau vegetation found on shale and transitional soils, such as Blue Gum High Forest and 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 approximately 5,750 hectares managed by council. This includes the 3,830 hectare Berowra Valley Regional Park that is jointly managed by Hornsby Shire Council and the Department of Environment and Conservation (DEC).

Ku-ring-gai has over 100 bushland reserves making up 1,100 hectares of bushland. Ku-ring-gai also adjoins three national parks (Garigal, Lane Cove and Ku-ring-gai Chase). Most bushland reserves are isolated small pockets of bushland of less than one hectare with the majority of bushland held within 10-12 larger reserve areas. The major bushland reserves are continuous with adjoining National Parks and form valuable wildlife corridors.

There are approximately 290 hectares of native bushland in Willoughby City Council of which 83 hectares is national park. Native bushland covers 12 per cent of this Local Government Area (LGA). Willoughby City Council and the community together manage 75 per cent of all bushland.

In Ryde there is 209 hectares of remnant vegetation along riparian corridors linking with the Lane Cove National Park and the foreshores of the Parramatta River that is under the care, control and management of City of Ryde. There is also the Wallumatta Nature Reserve, a portion of Lane Cove National Park and the Saltwater Estuarine Complex and Freshwater Wetland Complex totalling 350 hectares not under Council's control.

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

In North Sydney Council there are 50 hectares of bushland located mostly on the foreshores of Middle Harbour and Port Jackson. This represents only 4.5 per cent of original bushland cover.

Hunters Hill has 30 hectares of remnant bushland on public land, mostly located along creeks and foreshore edges. Though small in area, along with Lane Cove, these areas of bushland provide valuable link between Sydney Harbour and Lane Cove National Park.

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 (percentage)
North Sydney	50	50	100
Lane Cove	94	92	98
Hunters Hill	40	30	99
Ryde	559	209	38
Ku-ring-gai	3,148	1,161	16
Hornsby Shire	34,542	5,750	4
Willoughby	290	207	75
NSROC	**38,723**	**7,319**	**19**

Figure 18: The size and proportion of bushland in the NSROC Region by LGA, 2005/06

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 undertake active management of the bushland including bushland regeneration; noxious weed control; noxious weed inspections on private lands; bushland track construction and maintenance; and feral animal control.

Further management is provided through an array of specific planning instruments and development assessment processes. Development applications that occur on land containing bushland or adjacent to bushland are assessed for their impact on bushland, fauna habitats and threatened species, populations and endangered ecological communities or their habitats. Councils must comply with planning legislation and policies in making these assessments 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.

The northern Sydney councils employ professional bush regenerators who in addition to bush regeneration, undertake ecological and hazard reduction burning, track construction and maintenance, and pest species control. In addition, bush care groups across the region involve the community in restoring degraded bushland in their local neighbourhoods. Over 1,530 bushcarers are working in Hornsby Shire, Ku-ring-gai and Ryde areas to restore degraded bushland environments in their local neighbourhoods and to promote community awareness.

The northern Sydney 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; and
- Stormwater impact mitigation.

CASE STUDY

Community Nursery Day – Hornsby Shire Council

Hornsby Shire Council – Gardens For Wildlife

Hornsby Shire Council, known as the 'Bushland Shire', is endowed with large areas of significant and threatened forests, and unique fauna. Blue Gum High Forest (BGHF) and Sydney Turpentine Ironbark Forest (STIF) remnants span across rural and urban areas, and are important for a range of native fauna including the endangered Gang Gang cockatoo population. As part of Council's duty to manage, conserve and protect these remnants for the future, there are many opportunities to engage local residents to raise local awareness and work in partnership to achieve conservation goals.

In 2004 Hornsby Shire was successful in receiving grant funding from the NSW Environmental Trust for a two-year project aimed at increasing ground restoration works in Blue Gum and Ironbark forests through community participation. Over the period of the grant project, community members were successfully engaged through an existing bushcare program, through workshops and community events to further protect and conserve these forests while also improving habitat for local fauna.

A series of workshops dubbed 'Gardens for Wildlife' led 250 properties, in target areas, through a range of conservation topics aimed to encourage restoration on private property. Local nurseries and other non-profit conservation groups came on board as partners to this program to encourage participants to take a more pro-active role in improving their local environment. Residents worked in their own gardens to re-vegetate areas with provenance native plants, improve fauna habitat and remove weeds to enhance corridors of existing forest remnants.

Over 6,400 local native plants were provided to residents to assist backyard conservation, 80 nest boxes were installed in private properties to enhance poor natural nesting areas, 20 of these to improve breeding sites for the Gang Gang cockatoo. The success of these types of programs can only occur in partnership with the community. It is intended that the Bushland Shire will continue to raise awareness about its unique flora and fauna and support bushland restoration on public and private land with the community.

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. These include: North Sydney Oval, Ryde Aquatic Centre, Willoughby Leisure Centre, North Sydney Pool and Luna Park. There are also extensive natural areas within the Lane Cove, Ku-ring-gai Chase, Garrigal and Murramurra National Parks

Outdoor sporting facilities within the NSROC 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.

Open Space Demand

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

On-going population growth is expected to exacerbate supply problems by increasing the overall numbers in the population wishing to access open space. The reliance on public sporting facilities by schools is also expected to increase as school populations grow. There is limited opportunity for future development of new open space sites within the northern Sydney region. This is due to existing urban development, prohibitive costs of purchasing new sites, topography, adjacent bushland and natural areas. Ongoing requirements for sports ground rectification, upgrading and maintenance, as well as water restrictions, put other pressures on the ability of sports fields to carry additional utilisation.

Managing Our Open Space

Councils in the NSROC region work in consultation with the community to maintain a significant amount of open space to provide recreational opportunities for its residents and to ensure that the region remains a safe, healthy and attractive place to live. Within the NSROC region there is 5230 hectares of council managed open space. This amounts to about 76 square metres per person.

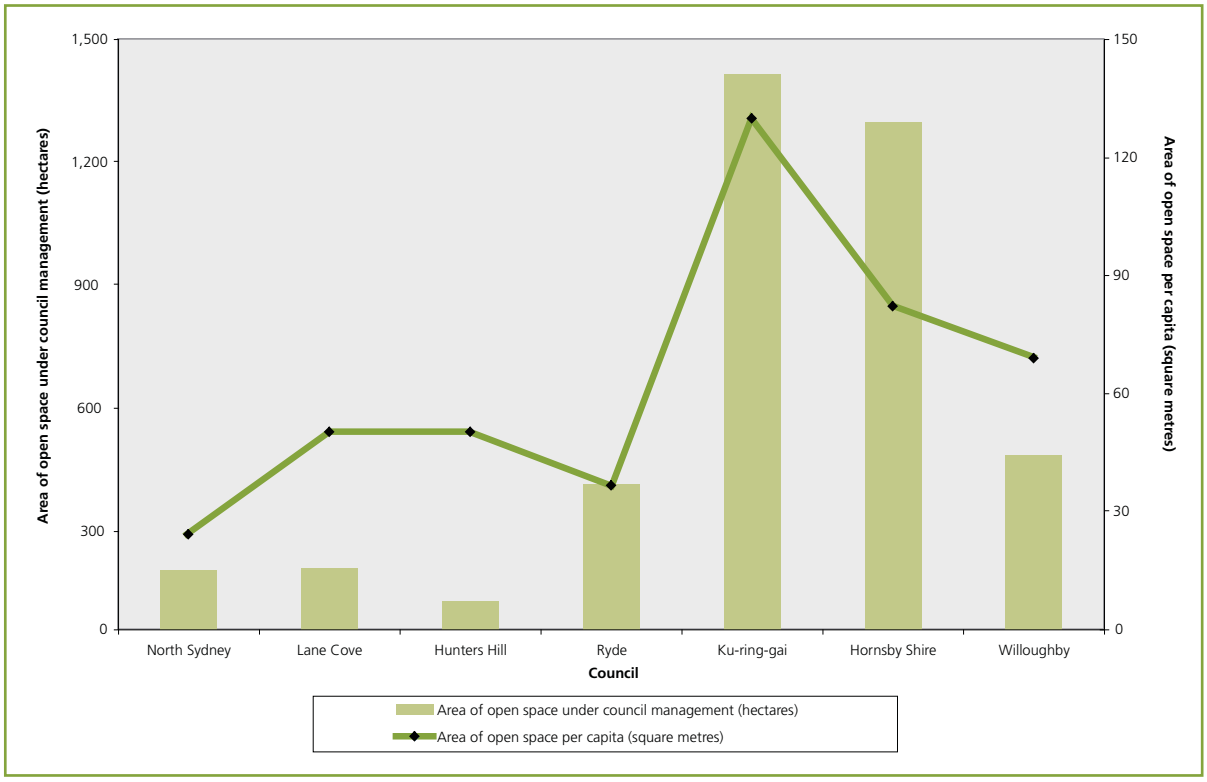


Figure 19: The total area of open space and area of space per capita for councils within the NSROC region, 2005/06

Responding to Community Needs for Open Space

The communities of NSROC place high importance on the effective management and retention of open space. Councils in the region have developed plans of management for their significant open space assets and these are regularly reviewed in conjunction with the community. Additionally councils continue to upgrade areas of open

Ku-ring-gai Council – Out in the Open Newsletter

Out in the Open is Ku-ring-gai Council's quarterly electronic newsletter dedicated to Open Space activities in Ku-ring-gai, including information about sport, parks, recreation and bushland facilities and activities. As well as including regular updates on Council's Capital Improvement Program, local events, success stories and funding opportunities, the newsletter also includes a 'Get Out There & Get Active' section which provides readers with lots of ideas for becoming more active and increasing their exercise. The newsletter was a winner of the Local Government Week Awards (Reporting to Your Community), for "mixing active sports information and environmental issues in a very clever and interesting manner".

CASE STUDY

space 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 upgrade existing facilities for both active and passive recreation, including playground and picnic facilities. Maintenance and upgrading is carried out to improve the functional and aesthetic qualities of council's developed open space but particular attention is paid to safety.

FIRE MANAGEMENT

Although Australia's ecosystems have evolved in the presence of fire, there is very little information on the impacts of altered fire regimes on the biodiversity in New South Wales. (Department of Environment and Conservation, 2000) Fire has a complex effect on native ecosystems and communities depending on the season, the frequency and the 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

On-going residential development and climate change provide significant pressures on the fire management regimes of the NSROC councils, particularly Hornsby Shire and Ku-ring-gai councils. In the NSROC region much bushland borders onto private property. The possibility of bushfires is therefore a significant concern especially for owners of properties edging onto 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 government to record on 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 bush fire prone land, unless the consent authority is satisfied that the development conforms to documented bush fire protection specifications or has consulted with the Commissioner.

Council	Number of sites of hazard reduction burns	Area burnt (by hectare)
North Sydney	6	1
Lane Cove	6	1.4
Hunters Hill	3	1
Ryde	0	0
Ku-ring-gai	29	130
Hornsby Shire	10	31
Willoughby	6	4.5
NSROC	60	168.9

Figure 20: Fire management by Council within each LGA in the NSROC region, 2005/06

Hazard Reduction in the NSROC Region

Fire management is undertaken in cooperation with the DEC, community fire units, local bushfire brigades, the NSW Fire Brigades and the NSW Rural Fire Service. Bushfire control measures are undertaken including hazard reduction burns. These protect property from bushfire hazards but at the same time can impact on 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 the seeds to germinate. *(Noonan 2005)*

Willoughby Council manages each controlled burn as an ecological burn. Fire is needed in much of Willoughby's bushland to maintain certain ecological communities and species diversity. The majority of bushland has adapted to recover from fire and many of the native plants require fire to germinate. Native animals can also benefit from small controlled fires. The thick regrowth of germinating plants and native grasslands that follow a fire are excellent food and habitat for native fauna.

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 the reserves by neighbouring residents. Some tree trimming is also done on public land, including where tree branches are overhanging buildings.

Controlled burns are used to keep the fuel load down so that if a fire is accidentally lit, it will be easier to control. The issue with controlled burns is that they change the fire regime in terms of intensity, frequency and season, and can affect a species capacity to regenerate.

Four of the NSROC councils have joined together to form the Hunters Hill/Lane Cove/Ryde/Willoughby Bush Fire Management Committee, which has prepared a Bush Fire Risk Management Plan and Plan of Operations in accordance with the *Rural Fires Act 1997*. Specific initiatives included a brochure *Preparing your property in times of bushfire* which was sent out to all new residents next to bushland as part of the new residents pack.

In the north of NSROC, Hornsby Shire and Ku-ring-gai Councils have joined together to develop the Hornsby Shire – Ku-ring-gai's Bush Fire Risk Management Plan that has been prepared in accordance with the *Rural Fires Act 1997*. This plan identifies the level of bush fire risk across the Hornsby Shire and Ku-ring-gai LGAs and establishes strategies that relevant land managers will implement to manage bush fire risks.

Willoughby Council has seen the development of a GIS database for its proposed hazard reduction burns. This system has demonstrated considerable benefit in the strategic planning and annual bushfire mitigation programmes and is to be used as a template for the Committee.

North Sydney Council has recently assessed and mapped the areas of bushland prone to bushfires across the LGA and is now proceeding with formal classification by the Rural Fire Service.

Hornsby Shire Council is continuing to extend the strategic asset protection and prescribed burn programs which aim to create fuel-reduced zones at the urban bushland interface of managed lands. It is also upgrading the fire advantage lines, such as fire trails, to assist with mitigation and suppression activities.

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 utilised 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 roads from vehicles.

Feral Animals, Pests and Invasive Weeds

Introduced species displace native species, reduce biodiversity, reduce farm and forest productivity, affect human and animal health and contribute to 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 to New South Wales and is a major problem in bushland of the NSROC region. For example, in Hornsby there are 46 species on the noxious weed list including lantana, pampas grass, castor oil plant and blackberry along with aquatic plants 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. Its dense growth out competes other plant species and is difficult to eradicate.

CASE STUDY

The Sydney Weeds Committees

The Sydney region stretches from the Hawkesbury River in the north, to Sutherland and Wollondilly in the south, and to the Blue Mountains in the west. All across Sydney noxious and environmental weeds are invading remnant bushland, waterways and farmland, affecting biodiversity by reducing habitat for native flora and fauna, and impacting on recreational, aesthetic and agricultural values, as well as human and animal health. However, the particular weeds and management issues faced by each sub-region vary based on the different landscapes, climatic variations and the available resources for weed control across the councils and government organisations.

The four regional weeds committees in Sydney were formed to promote a co-operative and co-ordinated regional approach to noxious and environmental weed management. The Sydney North Regional Weeds Committee covers the NSROC region as well as the Northern Beaches Councils. Membership of the Weeds Committees is made up of all local councils, and several state and federal government agencies and authorities responsible for land management. The staff who represent these government organisations on the committees are usually those with noxious weed, bushland and environmental management backgrounds.

Each committee has four meetings a year which are valuable opportunities for the member organisations to:

- talk to each other about how to co-ordinate noxious weed management at both the regional and catchment levels (as weeds will cross boundaries!);
- exchange information and ideas;
- apply for state and federal government funding available for joint projects;
- co-ordinate on ground weed control work that involves more than one organisation; and
- initiate ways to increase community awareness of noxious and environmental weeds.

Asthma Weed: Targeted by the Sydney Weeds Committees

To get all of this happening across 42 Councils and several state government bodies requires some administration and coordination in itself and the committees have the assistance of two part-time project officers.

More information on the Sydney Weeds Committees website www.sydneyweeds.org.au

Noxious weeds include:

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

Managing the Impacts of Introduced Species

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

All of the NSROC councils work with National Parks and Wildlife Service (NPWS) to carry out pest control programs in accordance with state-wide priorities such as the Fox Threat Abatement Plan and Regional Pest Management Strategies. Since 2000, the NSROC councils have been involved in the Sydney-North Regional Fox Baiting Program. In the program, foxes are identified as a high priority pest, rabbits are a medium priority pest and feral cats are a lower priority. As animals do not respect land tenure, collaborative programs are essential to reduce the impacts. (National Parks and Wildlife Service 2005). The aim of the program 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 in areas they have not been seen in for over twenty years. Cats are trapped only in bushland where there are identified environmental impacts from non-domesticated animals. Rabbits are controlled when they impact on 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 the amount of weed dispersed from the reserves. At the same time, bush regenerators, both contract and volunteer, work in bushland and areas of remnant vegetation,

Councils have developed their own program of weed control tailored to local needs in the form of Weed Management Policies. These policies outline council's weed management philosophy in respect to relevant legislation and community concerns, and provide guidance for various council program. All councils continue to distribute community information about noxious and environmental weeds. Bookmarks, booklets and other information are regularly distributed at community events to new bushland neighbours and other residents.

NATIVE FLORA AND FAUNA

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

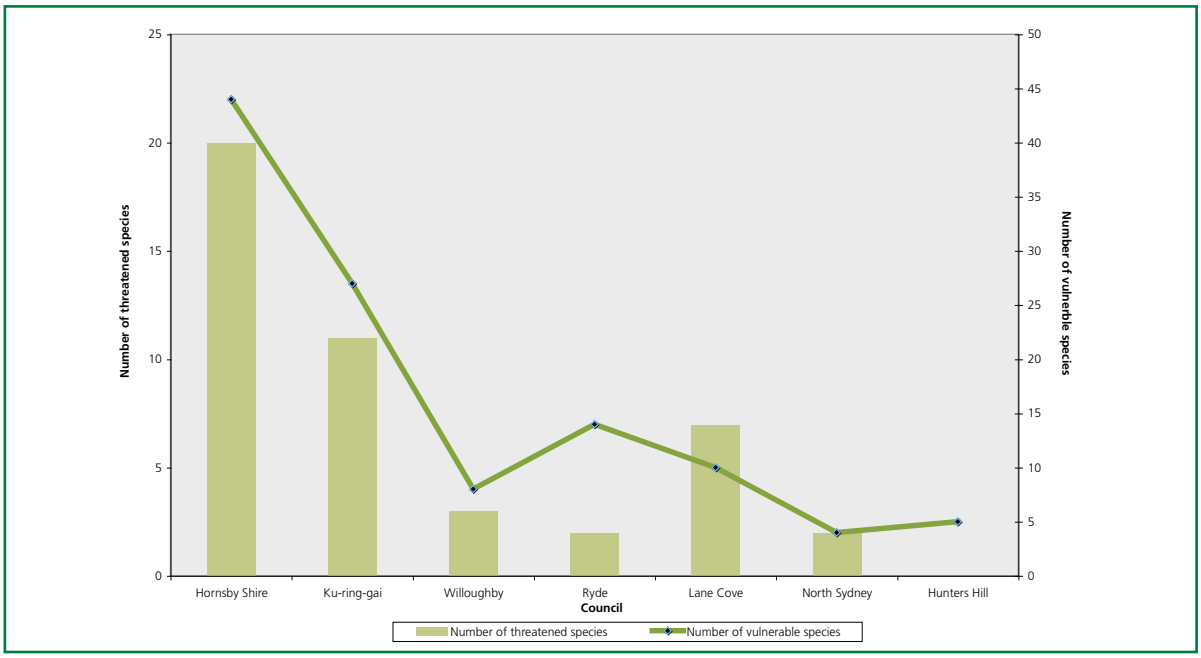


Figure 21: Number of Threatened and Vulnerable Species in the NSROC Region *(Noonan 2005)*

CASE STUDY

Hunters Hill Council – Education and Training in the Community

Each year Hunters Hill Council works with Lane Cove, Willoughby and North Sydney Council in the delivery of a series of Environmental Education Walks, Talks and Excursions. This year's program included workshop topics such as Grass identification, Native Plant and Bird identification, EcoGardening, Aboriginal Site Awareness, and Weed identification.

Excursions organised by North Sydney Council included a Field Trip to the Cumberland Plain. Evening talks ranged from 'Watching Sydney Storms' to 'Everything you need to know about Climate Change'. The sessions were advertised in resident newsletters, libraries and Council Offices.

Bushland Management Sections of councils also delivered Bushcare Training Courses for their Bushcare volunteers, Hunters Hill and Lane Cove Council trained two groups of new Bushcare volunteers during the year. Training topics included: bush regeneration aims and strategies, threatening processes, introductory weed identification skills, native plants of the local area, weed removal techniques, herbicide usage and native fauna habitat requirements.

Native plant identification workshop held at Hunters Hill Council

The Pressure on Native Flora and Fauna

The 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 now 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 floral species, fauna or plant communities.

As a result of habitat modification, certain species of birds now dominate urban bushland areas at the expense of others. For example, Currawongs, Sulphur-Crested Cockatoos and Noisy Miner populations have increased in numbers since European settlement whilst other species such as Black Cockatoos, Thornbills and Spinebills have declined.

Habitat fragmentation prevents the 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 clearing. Reducing the genetic diversity of the 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, however the area between the National Parks is largely residential and is 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 NSROC are home to a rich diversity of native plants and animals. For example, Hornsby Shire has over 1000 native plant species and 338 native vertebrate animal species and Ku-ring-gai has recorded over 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; 7 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 cleared for development. This has resulted in an unknown number of local extinctions of native plants and animals. This means that careful management of our bushland areas is essential to ensure the ongoing survival of the 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.

Conserving our Native Flora and Fauna

Councils continue to provide their resident communities with information about local flora and fauna and the 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 adjacent to remnant areas.

Councils run community nurseries, specialising in local indigenous plants propagated by council staff using local seeds and cuttings. The nurseries supply plants for councils' planting and re-vegetation needs.

NSROC councils are involved in a range of activities to conserve their 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 key biodiversity areas;
- Continuing native plant give-aways at community nurseries to encourage residents to plant local native species in their gardens. This improves the quality and amount of habitat available to native birds and animals;
- Working with Bushcare volunteers and groups and ensuring that all volunteers are trained to work safely and effectively in achieving the environmental aims of the program;
- 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;

Willoughby City Council – The Royal Easter Show

Willoughby City Council, the Sydney Catchment Management Authority, and other NSROC Councils held a Bushcare display at the Royal Easter Show in 2006. The display focussed on encouraging the use of locally native plants for residential gardens and promoting Bushcare volunteer programs. A sculptural native garden was created around a rustic bushland pavilion. Volunteer bushcarers and bushland staff from across Sydney assisted in manning the stall and spreading the Bushcare message. Hundreds of brochures and flyers on native flora, fauna, weeds, bushcare and sustainable living were distributed. The display became a popular attraction at the show and won First Prize in the forecourt display area.

CASE STUDY

- Continuing joint management initiatives such as Green Web to address habitat, species and corridor issues;
- Developing and implementing Plans of Management for all council managed natural areas;
- Growing native flora in community nurseries and distributing them 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

In order to assist in the preservation of local wildlife, Willoughby Council has designated a two-level hierarchy of Wildlife Protection Areas (WPA). Four reserves have been declared Level 1 WPA where no domestic pets are allowed. Six reserves have been declared Level 2 WPA where cats are not allowed and leashed dogs are permitted on the formal walking tracks. Council has undertaken an educational campaign to inform residents of the new regulations. This has included the installation of WPA signage, the production and distribution of a brochure and on-site reserve visits by staff.

In the City of Ryde, biodiversity inventories of community bushland have been identified as high priority. This is to provide baseline data on flora and fauna for management plans of individual parks and to safeguard the unique biodiversity makeup through future planning instruments. The species inventories intend to cover organism groupings such as plants, and aquatic and land invertebrates. The data will be compiled in a perpetual database that includes past and future recordings, and will be used for mapping. Council's contracted pilot flora and fauna survey of the Field of Mars, Brush Farm, and Lambert and Darvall Parks consists of one autumn and one spring survey in 2006, with the final reporting to be presented in December 2006. Council is looking into similar survey programs of other bushland areas from 2007. There will be a concurrent aerial infra-red mapping project of selected weeds and native plant species covering the local government area.

CASE STUDY

NSROC Regional Tree Policy

The NSROC region is recognised as having a substantial and diverse tree-scape characterised by its established street trees, substantial system of parks and reserves, and areas of remnant bushland within and next to substantial national and regional parks. The natural heritage values of the region need to be protected in the push for further urban consolidation.

NSROC in 2005 resolved to prepare a Regional Tree Management Policy for a coordinated regional policy for tree maintenance and management based on common values, to ensure appropriate and consistent tree protection and tree preservation within the NSROC region. The policy was formally adopted by NSROC in 2006.

The policy addresses five key issues:

- Development pressures in the NSROC region;
- Managing trees, including risk assessment of trees;
- Planning for additional and replacement trees;
- Conflicts with other urban infrastructure;
- Developing awareness in the community and balancing community outcomes.

It provides a set of regional tree management principles and specific tree maintenance guidelines.

This policy recognises the low level of regional data available on tree maintenance and management, the inherent difficulties in assessing tree stock across the region and the limited resource assistance provided by state and federal government in managing trees.

The NSROC region: recognised for its tree-lined streets

Native bushland is highly valued by the community for its cultural, recreational and aesthetic values.

In May 2006, Ku-ring-gai Council completed a Biodiversity Strategy providing a framework for the management and conservation of local biodiversity in natural and urbanised landscapes. The strategy aims to form partnerships with all stakeholders to prevent biodiversity loss and where appropriate increase it on both public and private lands. Another initiative run by Ku-ring-gai Council is Backyard Buddies – Australia's first urban wildlife translocation program. This program commenced with NSW National Parks and Wildlife and has been adopted and developed within Ku-ring-gai over the past 12 months. It is very popular with the community and now has over 170 residents on its database who have received, or are waiting for wildlife for their backyard. The program includes a captive breeding program of Bluetongue lizards; the distribution of local native fish for ponds and; the placement of sting-less native bee hives in resident's yards. In 2005-2006 13 Bluetongues were released, 27 ponds received native fish and 20 Trigona hives were distributed.

Council	Volunteer numbers	Volunteer hours	Value of hours (in dollars @ $20 per hour)
North Sydney	340	5,600	112,000
Lane Cove	217	2,100	42,000
Hunters Hill	80	1,890	37,800
Ryde	90	12,300	246,000
Ku-ring-gai	742	12,000	240,000
Hornsby Shire	815	12,067	241,340
Willoughby	300	5,630	112,600
NSROC	2,584	51,587	1,031,740

Figure 22: The contribution of Bushcare volunteers in the NSROC region, 2005

4

Water

PHOTO: DANIEL CUNNINGHAM

Water is one of the most important natural resources for humans and our environment. 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 time of on-going drought, climate change and water restrictions.

In recent times significant efforts have been made at both a state and regional level to improve water quality including reform packages introduced by the state government; 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)

A stand-out feature of the northern Sydney region is its extensive interface with water bodies that are important for all of Sydney, but particularly the 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 standing for all Australians. The seven Councils of NSROC 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 and hence benefits our own health. Measuring and protecting water quality remains a significant challenge for the northern Sydney councils. This is due to the resource demands in procuring good water quality data sets and the many variables which can impact on water quality which are beyond the control of individual councils.

Nonetheless many NSROC councils have commenced monitoring macro-invertebrate populations in local streams and waterways and interpreting data through the SIGNAL and AusRivAS Index systems. The councils also work actively 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 own localities. Each council is acutely conscious of the need to ensure that 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 New South Wales. In simple terms, less water falling in the catchment as rain 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 to the area of permeable surfaces within the catchment. Pollutants that are transported in urban run-off often dramatically alter local creek 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 the receiving waters, and damage to native vegetation exposed to contamination.

Water Quality in the Region

The state of the water quality throughout the northern Sydney region is highly variable depending on the proximity to development, timing of measurement and the degree of contamination due to sewerage overflows and land uses within the catchment. Overall the data indicates that the creeks and steams in the region where water sampling takes place are under stress associated with their urban context and the current dry conditions.

There remain some residential areas in Hornsby Shire, Hunters Hill, City of Ryde and Willoughby City council that are 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 but 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. Whilst this suggests that there is minimal cause for concern with the existing arrangements, it is not difficult to envisage the risks increasing if the number of properties in these areas were to increase significantly. *(Noonan 2005)*

The figure below provides SIGNAL 2 (Stream Invertebrate Grade Number-Average Level) 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; whereas low SIGNAL 2 scores generally denote poor water quality and disturbance.

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

Figure 23: Interpreting the Signal 2 Index.

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

Catchment	Locality Code	Signal2
North Sydney	Berrys Creek	2.86
	Quarry Creek	2.17
Hunters Hill	Brickmakers Creek	3.29
Ryde	Buffalo Creek	3.23
	Porters Creek	3.33
	Terry's Creek (end of Somerset Rd)	3.38
	Shrimptons Creek	3.58
	Archers Creek	3.38
Lane Cove	Stringybark Creek	3.25
	Gore Creek	3.38
Willoughby	Swaines Creek	2.83
	Flat Rock Creek	2.25
	Sailors Bay Creek	2.91
	Scotts Creek	2.29
	Sugarloaf Creek	3.11
	Blue Gum Creek	3.38
Hornsby Shire	Hornsby Creek	2.50
	Smugglers Creek	3.00
	Colah Creek	5.50
	Terry's Creek	3.50
Ku-ring-gai	Avondale Creek	2.00
	Blackbutt Creek	3.56
	Coups Creek	3.10
	Little Blackbutt Creek	2.50

Figure 24: Water quality results at sites within the NSROC region using Macroinvertebrate Analysis, 2005/06

CASE STUDY

Archer Creek restoration

The City of Ryde – Water Quality Monitoring

The City of Ryde is implementing a biological and chemical water quality monitoring program targeting the main creek systems within its local government area. Water quality is being assessed though the collection and analysis of macroinvertebrates, as well as the measuring of physical parameters, including temperature, pH and nutrient levels.

As expected, the results from the water quality monitoring show that the creeks in Ryde are significantly affected by the impacts of urban living. Typical results from the program include high electrical conductivity levels, low dissolved oxygen levels and high nutrient levels. These results have also been influenced by the current drought as it has lead to lower levels of flow and flushing.

The program is guided by the City's Community Water Quality Monitoring Steering Committee. The Committee is developing management strategies based on the water quality monitoring results. These strategies include a number of approaches to improving water quality, including:

- Education campaigns to reduce the water pollution, nutrients and the spread of weeds;
- The installation of gross pollutants traps to prevent litter from entering creeks;
- The rehabilitation and restoration of local creeks, including Archer Creek in 2005/2006.

The mangroves along the Lane Cove River, Lane Cove.

The Lane Cove River Estuary Management Committee

Made up of councils and state bodies which fringe the Lane Cove River estuary, this committee is coordinating three important projects which will assist in providing clearer direction on key management issues for the estuary.

- The development of an estuary education and interpretive program will highlight the importance of this aquatic environment. Increasing awareness in the community overall, the project is hoping to achieve a reduction in pollution issues and increase conservation efforts by the local community.
- The estuary is home to a number of threatened flora and fauna, one which encompasses many of these species is the threatened Coastal Saltmarsh Community. The information gained from mapping these communities, along with mangrove areas, will help assess the human and environmental impacts which are encroaching on these highly sensitive ecosystems.
- Recreational water activities in the Lane Cove River within the last 30 years have undoubtedly increased; with water and land users having an impact on many recreational foreshore areas. This project will assess the need for additional amenities and facilities for the benefit of all users of the estuary. This will result in a more enjoyable experience for users while reducing the environmental impact.

CASE STUDY

Maintaining Water Quality

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

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

CATCHMENT MANAGEMENT

Catchment management continues to play an important role in each councils' daily works. 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 are highly dependent on the 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 myriad of aspects ranging from noxious aquatic weed eradication programs, stormwater management and strategic urban planning. A number of these management options have already been detailed elsewhere in this report.

Pressures on Catchments in the Region

A significant pressure on NSROC's catchments is the inappropriate management of erosion and sediment control on building sites in the area. Conditions of Development Consent are imposed in an effort to control/minimise run-off. The soil on a building site is often disturbed by development activities on the site. The disturbed soil, along with other pollutants from the site, is

then washed into the stormwater or local creek system during the next rain fall. Polluted stormwater from building sites can cause flooding, weed infestations in downstream bushland areas, toxic algal blooms and a reduction in the diversity of aquatic species.

More insidious is the progressive sedimentation by fine particles washed down to creeks or the shoreline from areas with soil disturbance. 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 impacts from the longer-term accumulation of finer and less visible particles that continue to move across the catchment during periods of 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 of the waters 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 the assessed river length.

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 high degree of compliance although this is in part due to low rainfall conditions (see below). In harbour sites in the lower Parramatta River and in Darling Harbour remain problematic due to historic and current industrial activity.

Season	Faecal Coliform Seasonal Compliance	Enterococci Seasonal Compliance	Site Name	Area / Waterway
Summer	100	100	Tambourine Bay	Lower Lane Cove River
Winter	100	82	Tambourine Bay	Lower Lane Cove River
Summer	100	100	Woodford Bay	Lower Lane Cove River
Winter	100	100	Woodford Bay	Lower Lane Cove River
Summer	100	100	Woolwich Baths	Lower Lane Cove River
Winter	100	82	Woolwich Baths	Lower Lane Cove River
Summer	100	100	Greenwich Baths	Lower Parramatta River
Winter	100	100	Greenwich Baths	Lower Parramatta River
Summer	81	78	Northbridge Baths	Middle Harbour
Winter	82	82	Northbridge Baths	Middle Harbour
Summer	100	100	Hayes Street Beach	Port Jackson
Winter	82	82	Hayes Street Beach	Port Jackson

Figure 26: Compliance by per cent of pollution at NSROC Beaches, 2005/06 *(Beachwatch 2006)*

Improving Catchment Management

In 2006 the NSROC councils agreed to form the NSROC Waterways Group to provide a more holistic management structure for the waterways of the region. The group will be comprised of council staff from the seven NSROC councils and will receive administrative support from the Sydney Catchment Management Authority. The Terms of Reference and membership of the Group are still to be formally established.

The northern Sydney councils have also developed a number of catchment management plans to deal with catchments under their own control in close consultation with their communities. Actions are developed as part of

Hunters Hill Council – The Tarban Creek Restoration Project

In March 2006 the Tarban Creek Tributary Restoration Project was commenced. Tarban Creek in Hunters Hill is an estuary of the Parramatta River. Funded under the Oceanwatch Program, the tributary rehabilitation built on previous works from 1999, including the Tarban Creek Environmental Walk and Sharing Sydney Harbour Foreshore Access Program initiatives.

Located at the bottom of a steep catchment, and receiving runoff from Victoria Road Gladesville, Tarban Creek is a degraded stream. The main creek line also occasionally receives overflow from the Licenced Sewerage Overflow Point within the Sydney. water channel section.

Prior to works, the tributary's stormwater outlet was blocked with sediment and the drainage channel (120m x 30m) was infested with noxious weeds. A network of channels under the vegetation, transported sediment downstream to accumulate at the weir.

Grant project works included:

- Weed removal and burial;
- Crushed sandstone capping and jute matting to stabilise the substrate;
- Modification of a the channel network to create a main channel and wetland;
- The construction of six drop structures (pools and riffles);
- Revegetation using 4000 plants including sedges and rushes, grasses and shrubs.

Tarban Creek during restoration

Planting of native species at Tarban Creek

The work is ongoing and aims to reduce sedimentation downstream, facilitate pollutant breakdown and provide small bird habitat along Tarban Creek on the Parramatta River.

CASE STUDY

these plans and formulate 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 impacts of urban run-off.

Individual councils also carry out research and management programs to increase awareness, control and protection of their own catchment areas. In North Sydney the council's Environmental Protection Officer regularly inspects businesses and work sites to ensure that environmental controls and safeguards are being properly implemented and assists businesses in developing plans to help them protect water quality. North Sydney Council is also working with specific industry types such as marinas, service stations and mechanics to assist them in ensuring they protect water quality. The City of Ryde has been doing similar work with automotive businesses at Gladesville, Meadowbank and West Ryde.

Hornsby Shire Council has completed 26 creek remediation projects, 287 gross pollutant devices, 11 constructed wetlands, 31 sediment basins, 2 stormwater infiltration and reuse systems, and rehabilitation of 2 former tip sites through the Catchments Remediation Program. In 2005/06, the gross pollutant devices and sediment basins served to remove approximately 900 tonnes of sediment, litter and organic matter from the Shire's waterways. Monitoring

of two wetland ponds also revealed improved water quality through the reduction of nitrogen and suspended solids under base flow and small storm conditions. The wetlands also provide habitat refuge, fauna corridors and vegetation links, scenic amenity and places for both education and scientific investigation. Council's street sweeping program served to prevent over 2000 tonnes over leaf matter, sediment and litter from entering the Shire's waterways. Council is also monitoring 37 sites across the shire for water quality, of which 20 sites are also monitored for aquatic biological health. Recreational water quality monitoring was also conducted over Summer 05/06 at Brooklyn baths and Crosslands Reserve (Berowra Creek).

In order to improve the health of catchments, the City of Ryde implements its Stormwater Management Plan Program of Works. This is a comprehensive program that identifies, schedules and costs major environmental programs that address pollution control in catchment areas. The program provides an integrated approach to catchment management across several sections of the City of Ryde. A number of activities form the program of works, including: water quality monitoring, community education, the inspection of automobile businesses, the construction of gross pollutant traps and creek rehabilitation, and restoration works such as those performed at Maze Park.

Councils also play a key role in educating the community through specific literature, displays and workshops which identify the interconnectivity of human action and its environmental consequences in the catchment. For instance the City of Ryde developed an exhibit for this year's National Shell Show held at the Ryde Eastwood Leagues Club. Displays included Maps of the catchment and sub catchments in the City of Ryde so that residents could identify their local creeks.The City of Ryde is also working with the local community in Eastwood on a catchment awareness raising project with the slogan of 'Eastwood Canal Connects you to the River'.

Willoughby City Council has been focusing on the effects of urban development on catchments in the region. Urban areas are made up of impervious surfaces that prevent the infiltration of rain. As a result, the downstream waterways are impacted by high volumes of water at high velocity that scour banks causing erosion and remove aquatic life from the waterways. Willoughby City Council has been developing plans to mitigate these impacts by placing large stormwater storages in the upper catchments. Two sites are being considered; Ferguson Lane in the Chatswood CBD and Artarmon Reserve. By harvesting and treating stormwater for reuse the volume of discharge into urban creeks will be reduced and water quality will be improved.

STORMWATER MANAGEMENT

In urban areas, stormwater run-off typically contains litter, bacteria, pesticides, metals, sediments, oils and grease, some of which are sources of excess nutrients. These pollutants 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 the management of stormwater in urban areas is essential for supporting the conservation of our land resources and biodiversity. It is one way in which we can protect the quality of life for all urban inhabitants and make a significant contribution toward sustainability.

Stormwater Issues

Development in the NSROC is resulting in an increase of impervious surfaces due to 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 increase in pollutant levels in receiving water-bodies as well. Though there are measures to reduce the effect of this increased 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 down to natural waterbodies at many locations. The topography of areas such as North Sydney, Lane Cove, Willoughby and Hornsby Shire provides for spectacular scenery, but at the same time facilitates rapid flows during heavy rainfall. Accordingly there are sound reasons to be concerned that development in the region could stress the surrounding receiving waters. Not only

North Sydney Council – Butt Littering Reduction Campaign

North Sydney Council was successful in gaining a grant from the Butt Littering Trust for a campaign to:

- Increase public awareness about littering laws and penalties;
- To reduce butt littering on CBD streets by at least five per cent;
- To educate smokers about butt disposal options;
- To reduce stormwater pollution caused by cigarette butts

It involved a combination of education, enforcement and infrastructure initiatives.

The campaign focused on the CBD areas of North Sydney, Crows Nest and Neutral Bay. Twenty smokers poles were installed in these areas. This was followed by a week long education campaign during three-hour lunch periods. These featured street entertainers dressed as marine creatures who educated smokers about the ecological impacts of butt littering and the fines associated with it. Smokers were also warned about the upcoming enforcement week.

Personal ashtrays and lollies with 'butt facts' were distributed. The 'Butt blitz' took place the following week with Council Rangers enforcing the litter legislation around the three CBD areas over the same lunch period. Rangers supplied personal ashtrays to reduce the inclination to re-offend in the future.

The campaign was reinforced with posters on the community noticeboards, press releases, paid advertisements and information on the council website. Butt litter in the activity area decreased over 16 per cent and use of the smokers poles increased by 50 per cent after the education period.

CASE STUDY

will the 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)*

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

- Hornsby Shire Council has found that high levels of nitrogen and chlorophyll-a at the Berowra Creek ferry crossing and at Calabash Point are of major concern. The origin of these nitrogen concentrations is a combination of sources including the two Sewerage Treatment Plants (STPs), leachate, onsite sewage disposal and stormwater from urban and industrial areas. Upgrades of the STPs have significantly reduced the amount of nitrogen entering the estuarine areas. It is also anticipated there will be a corresponding reduction in the frequency of algal blooms.
- The industrial areas within the Hornsby Shire region at Hornsby, Thornleigh and Mount Ku-ring-gai continue to create poor water quality by releasing run-off with high concentrations of suspended solids, nitrogen and faecal coliforms.
- As part of the Environmental Levy, Ku-ring-gai Council has identified twelve sites within the local government area where stormwater harvesting will be undertaken to assist in irrigating Council facilities

and reduce the impact of stormwater on downstream areas.

- Northbridge Baths within the Willoughby LGA is an enclosed tidal swimming area in Sailor's Bay. Water quality in the baths is affected by urban run-off discharging to Sailor's Bay. The baths are closed for 48 hours after a rainfall event of 20mm or greater over a three day period.
- Macro-invertebrate monitoring at seven sites in the freshwater creeks of Middle Harbour and the Lane Cove River, conducted by the Willoughby City Council, shows impaired water and habitat quality. Water quality at Scott's Creek continues to be severely degraded despite the opening of the Northside Storage Tunnel. *(Noonan 2005)*
- Macro-invertebrate and chemical testing at five sites across the Ryde LGA was conducted during Spring and Autumn months this year. Low dissolved oxygen and high nutrient levels continued to show up consistently across all sites. The diversity of macroinvertebrate results reflected findings that would be expected for typically impacted urban streams, however Shrimptons and Buffalo Creeks both discharging to the Lane Cove River had the poorest AUSRIVAS results this year. One encouraging sign is that results across all sites over the past two years seem to be improving, although it is too early into the program to confirm this as a trend.

Responding to Stormwater Issues

Within the NSROC region each council has acknowledged the 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 address the on-going pressure on the existing stormwater system to handle larger flows as a result of population growth. Neither property rates nor developer levies are likely to be adequate to retro-engineer the vast stormwater drainage networks that each own, even taking into account the $75 million that the NSW Government has allocated in grants across all of NSW to improve the management and planning of the drainage systems. *(Noonan 2005)*

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 rain water tanks to reduce flows during rain events.

In the NSROC region education is considered central to the improvement of stormwater management and the prevention of water pollution. Education is delivered to both council staff and the community.

Hornsby Shire Council in partnership with the Department of Environment and Conservation, rural landholders and other local councils worked towards improving the environmental and stormwater management of private holdings on the urban rural fringe. The Urban Fringe Stormwater Management Program targets local landowners with private holdings of around 1 to 10 hectares. The program focuses not only on commercial activities such as nurseries, poultry, and horticultural pursuits, but also is incorporating the larger residential holdings. Through this program, education resources for both council officers and private landholders were developed and private landholders' capacity to manage their land in a sustainable manner was increased using a resource kit and workshop series.

Willoughby City Council received a grant from the Butt Littering Trust to campaign in attitudinal change toward binning cigarette butts instead of littering. The campaign, conducted throughout the City of Willoughby from March 20 to 24, provided smokers with information cards and personal ashtrays and requested smokers to sign pledge cards outlining what they will do to reduce pollution in Willoughby by disposing of cigarette butts carefully. Almost 2,000 pledges were collected around the city's butt hotspots.

Hunter's Hill Council senior management have responded to the issue of stormwater by employing an extra staff member specifically to investigate this area. The 'Stormwater and Sustainability Officer' is charged with responsibility of implementation of stormwater projects identified under the Environmental Levy and overseeing contracts for cleaning of gross pollutant traps, amongst other tasks. At Hunters Hill, stormwater is no longer being viewed as 'refuse', but as a 'resource'. The council Stormwater Engineer reports that under DCP 25 (Sustainable Water), 130 Development Applicants were instructed to provide roofwater storage (rainwater tanks) as part of their

The NSROC councils are investing in a number of strategies to deal with stormwater issues, including replacing infrastructure, installing Gross Pollutant Traps, education, planning and installing rain water tanks to reduce flows during rain events.

proposed works in 05/06.

Ku-ring-gai Council is aiming to reduce the effects of stormwater run off from Council owned facilities on adjacent and downstream lands. The stormwater harvesting project at Barra Brui oval, St Ives, recycles nutrient rich water and reuses it for irrigation on the Oval. As a result of the reduction in runoff volume and pollutant load, an improvement to the health of downstream areas will be expected. The project also involves bush regeneration in the surrounding areas with the help of contractors, local bush care groups, schools and scouts. This will reduce the amount of weed currently present upslope and down-slope of the site having long term benefits to Garrigal National Park through a reduction in the source of weed seeds.

Council	Gross Pollutant Traps (GPTs) per area	Tonnage waste removed from GPTs	Cost of GPT construction ($)	Cost of GPT maintenance ($)
North Sydney	25	256	360,000	65,286
Lane Cove	4	9	0	15,000
Hunters Hill	43	5	3,500	10,040
Ryde	26	63	0	29,943
Ku-ring-gai	131	22	0	12,000
Hornsby Shire	287	900	705,000	357,000
Willoughby	6	75	0	21,094
NSROC region 2005/06	**522**	**1,330**	**1,068,500**	**510,353**
NSROC region 2004/05	**383**	**1250**	**1,421,359**	**398,966**

Figure 27: Performance and expenditure relating to Gross Pollutant Traps within the NSROC region, 2005/06

5 Atmosphere

PHOTO: MARGARET MATHERS

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. Seventy five 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, the Greenhouse Effect is being enhanced causing accelerated Global Warming. Global 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.

AIR QUALITY

The processes, phenomena and management approaches that affect regional air quality do not operate on just 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 electricity generation and fuel burning for home heating. Poor air quality is usually associated with heavily populated areas where motor vehicle use is high and a high prevalence of industry and solid fuel burning heaters in homes.

Community attitude surveys on environmental issues in urban areas of Australia repeatedly demonstrate the high value that is 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)*

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

Figure 28: Contribution of motor vehicles to air emissions in major Australian cities, 2005 *(Noonan 2005)*

Pressure on Air Quality

As population density in NSROC increases, the incidence of vehicle usage will increase which has the potential to create more frequent high pollution days within the region. 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 the air pollution from dispersing.

Councils, the National Parks and Wildlife Ser vice (NPWS) 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, this activity also has the potential to impact on local air quality. Bushfires (i.e. wildfires) also impact on air quality in a similar way and usually to a greater extent.

Air Quality in the Region

Over the last two decades, air quality has improved significantly with reductions in carbon monoxide, nitrogen dioxide, sulphur dioxide and lead. However, photochemical oxidants and particle pollution still remain above air quality standards. Emissions are mainly from motor vehicles and while new cars produce less emissions, increased ownership of cars offsets any improvements. (Department of Environment and Conservation, 2003)

NSROC has a strong interest in ensuring that a significant population increase in its region does not lead to deterioration in the air quality overall. Its major difficulty is that its councils have very limited influence over problems of this type because, when they do 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 very few steps that even groups of councils can take collectively to address the cause.

There is only one permanent state funded regional air quality monitoring station in the NSROC region located at Lindfield in the grounds of the CSIRO Division of Radio Physics. It is situated in close proximity to Lane Cove National Park at an elevation of 60 metres in a residential area that represents part of the DEC East Sydney air quality reporting region. This site is currently not operational due to nearby construction work. Local monitoring is conducted by Willoughby City Council (see case study) and additional monitoring stations in the Lane Cove vicinity have commenced operation.

CASE STUDY

Willoughby City Council – Air Quality Monitoring associated with the Lane Cove Tunnel Project

Willoughby City Council's Environmental Research and Audit Unit has established an Ambient Air Quality Monitoring Station (AQMS) within the grounds of Mowbray Primary School. The AQMS has been installed to monitor the existing background air quality as well as monitor the future impact of the Lane Cove tunnel ventilation stacks on the local air shed and surrounding community.

The AQMS has been fully operational since January 2006 and the equipment is recording ambient air quality data for Oxides of Nitrogen (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).

A comparison of data collected from the six Lane Cove Tunnel (LCT) Air Quality Monitoring Stations and Willoughby's AQMS demonstrates a close correlation of results, indicating pollution levels appear to be strongly influenced by regional air quality factors. The six LCT stations are independently operated and audited. Data was supplied by Thesis John Holland and CMPL.

The two charts below show particulate matter results. Particulate matter is the term used to describe the particles that remain suspended in the air because of their small size. They originate from smoke, dust, crushing and grinding rocks, motor vehicle emissions, etc. The human respiratory system is normally able to deal with inhaled particles however extreme exposure or sensitive individuals can result in increased rates of respiratory illness. The smaller $PM_{2.5}$ particles contain more toxic substances like trace metals and carcinogenic organic compounds and these maybe carried more deeply into the lungs. The known health effects include coughing, wheezing, asthma, respiratory disease and premature death in people with existing heart or lung conditions.

The National Environmental Protection Measure (NEPM) standard for PM10 was exceeded twice between July 2005 and June 2006. This is a widespread occurrence in the Sydney region. Whilst the $PM_{2.5}$ results comply with the NEPM advisory reporting standard for $PM_{2.5}$ (25 µg/m³) for the daily average, the yearly average may be exceeded. This will be reported in subsequent years.

Also monitored but not included in this report is carbon monoxide and nitrogen oxide. Monitoring indicated that levels were within the NEPM standards.

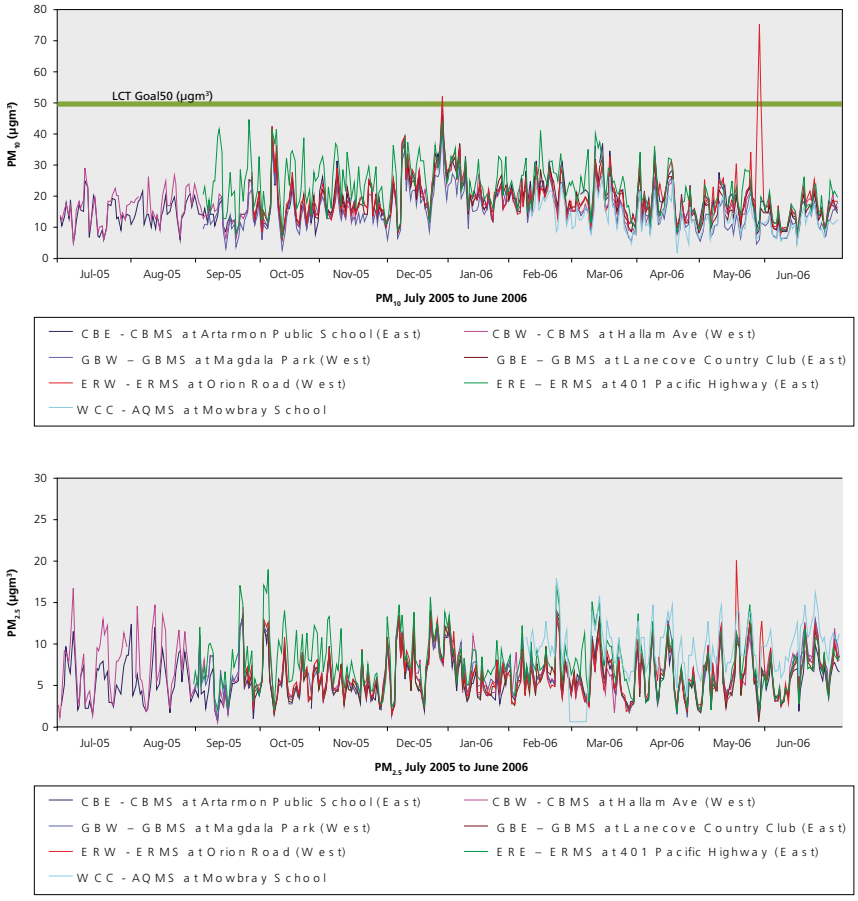


Figure 29: Air Quality comparison at seven Lane Cove Tunnel Air Quality Monitoring Stations April 2006

Responding to Air Quality Issues

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 assist the state government with regard to individual events. But aside 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 the following issue of greenhouse gas emissions.

GREENHOUSE GAS EMISSIONS

Globally and nationally there is a widespread acceptance that climate change is being impacted by greenhouse gas emissions and that this process is set to continue for the near future. While at a national level Australia is one of the few countries in the world not to have signed the Kyoto Treaty on greenhouse gases, much work is being done at a state and local government level, and at a community level, to try and reduce green gas emissions through educational programs and the introduction of energy conservation measures. There is widespread acceptance in this country of the threats posed by climate change globally, and to Australia in particular.

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

In 1998, CSIRO ran a regional climate model for south-eastern Australia using the range of global emissions scenarios generated by the Intergovernmental Panel on Climate Change. The simulation predicts that by the year 2050, NSW may become 0.5 to 2.7oC warmer with 10-50 per cent more summer days over 35oC and 20-100 per cent fewer winter days below 0oC. Despite small changes in average rainfall, the number of spring droughts will double in all regions except the southeast, and the number of extremely wet summers, autumns and winters will double in some regions. Extreme daily rainfall intensity and frequency increases in many parts of NSW are predicted particularly in summer and autumn. CSIRO advises that these results should not be regarded as actual forecasts but rather as indications of possible directions and scale of change and used to assess the potential risks to life, biodiversity and economic interests.

The global warming trend is clearly reflected in Australia, whereby 2005 was the warmest year on record for Australia. Hornsby Shire Council is planning to undertake research into the local impacts of climate change and develop a program for adaptation to predicted impacts as part of its Sustainable Energy Strategy.

Greenhouse Gas Issues

The weight of recent published evidence is that 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 the extensive research underway in clean coal technologies occurring in the US and Australia, and this should produce greenhouse benefits. But the growth of energy consumption patterns in areas such as northern Sydney is nevertheless likely to be inextricably linked to additional carbon dioxide generation somewhere in the production or transmission chain that supplies energy to the region.

NSROC's growing population and associated urban consolidation is likely to generate increased greenhouse gas emissions due to the following:

- Increased demand for air-conditioning due to a reduction in the tree canopy and for construction of higher buildings with greater direct sun exposure;
- Increased traffic congestion resulting in less efficient consumption of fossil fuels; and
- Increased ownership of energy consuming appliances.

The introduction of the energy conservation opportunities proposed in schemes like the State Government's Building Sustainability Index (BASIX) should eventually show a positive impact. The timing of this support will be influenced by the proportional change in the residential dwellings that incorporate 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

While all of the councils are committed to reducing greenhouse gas emissions, councils are only just beginning 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 commenced purchasing 'green energy' which is produced from greenhouse friendly sources. While councils also run a number of education programs in this area, the total impact of council in reducing greenhouse gas emissions in the broader populace is unknown and difficult to disaggregate from state and federal initiatives.

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 for council run community projects
North Sydney	3,182	2,941	12,580
Lane Cove	763	n/a	n/a
Hunters Hill	202	n/a	n/a
Ryde	5,351	56	0
Ku-ring-gai	1,339	435	0
Hornsby Shire	1,819	2,498	48,229
Willoughby	2,762	1,249	6,647
Total for NSROC region	20,284	7,123	67,456

Figure 30: Greenhouse emissions and reduction through council action in the NSROC region, 2005/06

Responding to Greenhouse Emissions

The northern Sydney councils have responded in a wide variety of ways to the issue of climate change and greenhouse gas emissions. Whilst they continue to play an educative role with their communities, the NSROC councils have concentrated on leading by example through implementing programs and actions within their own facilities to reduce energy consumption and greenhouse gas creation. The NSROC councils have been assisted in this process by membership of the CCP Program and by the introduction of guidelines for the development of Energy Savings Plans. Further work needs to be done within the community once the more obvious energy savings have been obtained, but these future savings will come at an increasing implementation cost.

Councils have shown considerable innovation in this area as demonstrated by Willoughby City Council which has entered into an Energy Performance Contract (EPC) as a way to reduce both energy and water consumption. Energy Performance Contracting is about reducing energy consumption by investing in proven and cost effective energy-saving technologies, systems and procedures. Under the contract, qualified energy consultants evaluate the facilities for energy savings that can be achieved and then offer to implement the improvements.

While Willoughby City Council has been proactive in reducing greenhouse gas emissions from its own operations, Council has been encouraging residents to do the same. Throughout the year, six workshops were held on how to save energy around the home and energy savings were further encouraged with energy efficient lighting give-aways.

Ku-ring-gai Council has updated the Cities for Climate Protection Greenhouse Action Plan to integrate with the Energy Action Plan. As part of the implementation of the Savings Plan, Council is investigating Energy Performance Contracting as a way of financing a larger scale effort to reduce our energy consumption at Council facilities. Together, the plans encompass all areas of energy reduction within Ku-ring-gai and provide a strategic framework for greenhouse gas reduction in Ku-ring-gai.

Hornsby Shire Council has replaced its original Greenhouse Gas Reduction Strategy (2000) with the Sustainable Energy Strategy 2006-2010. This outlines Council's intention to continue its local greenhouse abatement actions in order to manage the anticipated increase in energy demand from increases in the number and size of Council assets and the Shire's growth. To tackle climate change beyond 2010, the draft Strategy commits to new greenhouse reduction targets for 2012 and 2050, to ensure the impacts on the sustainability of the Shire are significantly reduced.

The City of Ryde is close to finalising its Local Greenhouse Gas Reduction Action Plan and has established an internal multi-disciplinary team of staff known as the CORWEST Team to implement the plan. For 2005/06, measures implemented have resulted in a saving of over 5,040 tonnes of CO_2.

Other council responses include:

- Upgrading Building Management Systems;
- Putting flow restrictors on taps in council facilities;
- Installed AAA rated shower heads throughout council buildings;
- Purchasing hybrid petrol/electric vehicles for council's fleet;
- Enabling smaller capacity fleet vehicles;
- Adopting the Building Sustainability Index;
- Tree planting.

North Sydney and Lane Cove Council – Sustainable Cities

North Sydney Council and Lane Cove Council were successful in gaining a grant from the Environmental Trust for a joint project titled "Sustainable Cities".

The project focuses on delivering an environmental sustainability program for local small businesses in two local government areas (North Sydney and Lane Cove). It is an integrated sustainability project which aims to look at the ways businesses currently operate and identify opportunities to be more environmentally sustainable. Running over a 10 month period, it will be delivered in partnership with a private contractor and involves the collaboration of North Sydney and Lane Cove Councils and the local chambers of commerce.

This program involves a multi-faceted approach to improving the sustainability of small businesses along the chosen business strip/location. It encompasses capacity building through training workshops; community education through face-to-face sustainability surveys and audits, and provision of a manual for small businesses; and communication/publicity through newsletters and local press articles.

The program aims to reduce the environmental impact of small businesses in the areas of waste, water, energy, chemical use and transport. It also seeks to achieve other important outcomes such as cost savings, improvements in the viability of businesses and stronger networks amongst traders.

The program will demonstrate positive change through improved economic, social, environmental and cultural education. The eventual results will be reflected in the improved community engagement that embraces sustainability as part of everyday business. The environment surrounding the two local government areas will be improved because there will be reduced air, land and water pollution. Many residents and businesses will be influenced by this education program because it involves up to 40 small businesses located over a large geographical area.

Council has chosen to deal with the sustainability issue through the channel of Small to Medium Enterprises (SME) to achieve the biggest impact and produce practical outcomes. The SME sector is by far the largest in Australia, however due to time and resource restrictions, it is the least able to understand and more importantly address sustainability issues in the workplace. The program is delivered at a level that an SME can relate to and manage. It recognises that the most efficient way of tackling sustainability in the SME sector is to engage the trader groups and encourage them to own the process. This is the largest program of its type in metropolitan NSW.

CASE STUDY

6

Soil 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 levels and erosion. ***(Department of Environment and Conservation, 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.

Due to the steep inclines, gullies and undulating terrain of the NSROC region, and the presence of numerous 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 physical structure of the soil and damage vegetation growing in the soil. If the acid finds its way into water bodies it can have significant impacts on riverine and estuarine ecologies (causing fish kills for example), as well as corroding man-made structures such as bridges and boats.

Council	Area (hectares)
North Sydney	26
Lane Cove	15
Hunters Hill	5
Ryde	98
Ku-ring-gai	0
Hornsby Shire	1,063
Willoughby	35
NSROC	1,242

Figure 31: Known potential area of acid sulfate soil sites in the NSROC region, 2005/06

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 carefully managed and known repositories of sediments rich in iron sulfides must be carefully mapped.

Managing Acid Sulphate Soils

Extensive mapping of acid sulfate soils has already been completed by the state government. More detailed local mapping is still being completed by some of the councils in conjunction with the Department of Lands. The councils belonging to NSROC have prepared, or are in the process of preparing, the appropriate planning instruments to ensure disruption of acid sulphate soils is minimised. Some councils have adopted acid sulphate soils management plans in the event that acid run-off occurs as a result of soil disturbance.

SOIL EROSION

Soil erosion is a natural process that is caused by the action of wind and water which is accelerated by human activities and is a major problem throughout Australia. The slow rate of soil formation in Australia means that soil is effectively a non-renewable resource. Erosion has the effect of reducing the soil's nutrient levels and its ability to retain moisture for plant growth. Increased rates of erosion can also have an adverse impact on water quality in streams and rivers. *(Department of Environment and Conservation, 2000)*

Causes of Erosion

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

Erosion is a particular concern around the many development sites in the NSROC region, where vegetation removal and earthworks expose and disturb soil layers. Erosional processes, such as wind and water run-off, 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 impact 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 the site and onto adjoining areas increasing the rate of soil loss. Finally, increasingly poor weather conditions, including storms, high winds and drought, culminate in dieback of vegetation required to stabilise soils.

Erosion in the Region

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

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

The common causes of soil erosion in NSROC are the loss of vegetation cover, modification of the soil landscape, and increases in surface run-off from impervious surfaces such as roofs, roads and footpaths.

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. Due to 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 that erosion and erosion-related impacts do not significantly impact on the environment. Where major development does occur, 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 (onsite storage devices). Councils have also been active in rehabilitating areas where stormwater drains enter creeks and providing rock armouring to reduce the erosion potential. The northern Sydney councils 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 of the 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.

Willoughby City Council's Compliance Unit has continued its program to control and regulate dust, soil erosion and sediment control on building sites. In this regard, officers have conveyed verbal advice to workmen on building sites as well as directing letters, Notices, Orders and Fines to builders under the *Environmental Planning and Assessment Act, 1979* and Protection of the Environment Operations Act, 1997 where breaches of Development Consents and/or pollution events have occurred.

LAND CONTAMINATION

Certain past and current uses of land can have the potential to contaminate through the introduction of chemicals into the soil, posing a risk to human health and/or the environment. This can inhibit certain types of future development on the site depending on the level and type of contamination. This may require remediation of some sites to allow future use to occur without potential harm to human health and the environment.

In NSW the management of contaminated land is shared by local councils, the DEC and Department of Planning The *Contaminated Land Management Act 1997* empowers the DEC to regulate and control contaminated sites that represent 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 contaminated material behind. 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 that the issue of land contamination has become more pronounced. Added to this is an increase in the awareness of health impacts 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, posing a risk to human health and/or the environment. The DEC has developed a list of activities that may cause contamination, including agriculture/horticulture, landfills, service stations, engine works and dry cleaning. Before carrying out 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 DEC-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 during the 2005/06 reporting period is as follows:

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

Figure 32: Number of declared contaminated land sites in the NSROC region, 2005/06

Responding to Land Contamination

All Councils continue to monitor development activity in relation to contaminated sites on an on-going basis. Councils work closely with the DEC to ensure that the Contaminated Land Record is accurate and up-to-date. In addition, councils take the following steps to ensure land contamination is managed appropriately in the region 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.

7 Appendices

PHOTO: RAY AND ELMA KEARNEY

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

LGA – Hornsby Shire Flora Threatened Species

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

LGA – Hunters Hill Fauna Threatened Species

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

LGA – Hunters Hill Flora Threatened Species

Scientific Name	Common Name	Legal Status
Darwinia biflora		V
Genoplesium baueri		V

LGA – Ku-ring-gai Fauna Threatened Species

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

LGA – Ku-ring-gai Flora Threatened Species

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

LGA – Lane Cove Fauna Threatened Species

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

LGA – Lane Cove Flora Threatened Species

Scientific Name	Common Name	Legal Status
Camarophyllopsis kearneyi		**E1**
Hygrocybe anomala var. ianthinomarginata		**V**
Hygrocybe aurantipes		**V**
Hygrocybe austropratensis		**E1**
Hygrocybe collucera		**E1**
Hygrocybe griseoramosa		**E1**
Hygrocybe lanecovensis		E1
Hygrocybe reesiae		V
Hygrocybe rubronivea		V
Melaleuca deanei		V
Syzygium paniculatum		V

LGA – North Sydney Fauna Threatened Species

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

LGA – North Sydney Flora Threatened Species

Scientific Name	Common Name	Legal Status
Acacia terminalis subsp. terminalis		E1

LGA – Ryde Fauna Threatened Species

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

LGA – Ryde Flora Threatened Species

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

LGA – Willoughby Fauna Threatened Species

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

LGA – Willoughby Flora Threatened Species

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

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

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