NORTHERN SYDNEY REGIONAL ORGANISATION OF COUNCILS
STATE OF THE ENVIRONMENT REPORT
2006 / 2007

Northern Sydney Regional Organisation of Councils
nsroc

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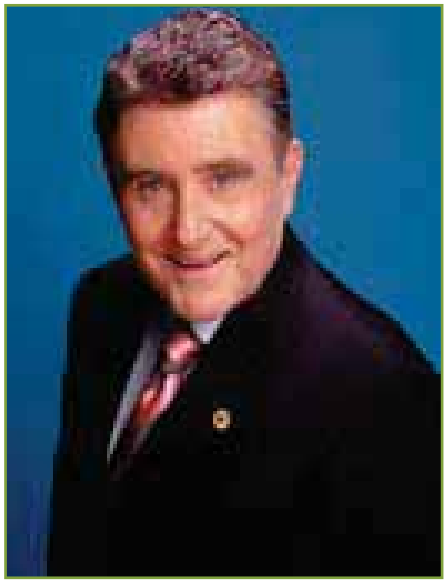

PRESIDENT'S MESSAGE

This is now the third State of Environment (SoE) report completed by the seven councils which comprise NSROC (Hornsby Shire, Hunter's Hill, Ku-ring-gai, North Sydney, Lane Cove, City of Ryde, and Willoughby City). Like its predecessors, I anticipate it will be well received by the community and environmental professionals as a more complete picture of the region built on robust data sets and extensive reporting and analysis. As the SoE reporting process continues over time councils in the region are now able to compare data with data from preceding years. This enables us to see where we are improving in our environmental management, where the environmental pressures are getting stronger, and where more work needs to be done.

In the past twelve months we have observed continued community concern over water shortages, global warming, clean energy, population impacts and transport issues. With escalating food prices, high level water restrictions and a commitment from the State Government to build its controversial desalination facility in southern Sydney, the impacts of a prolonged drought in the region are being keenly felt. There is also significant national debate over what steps Australia should take as a nation to address the issue of climate change and environmental sustainability as a result of the upcoming federal election. All indications are that the environment will be a significant voting issue and we can only hope that this will result in new policies which address our environmental problems in innovative and meaningful ways.

In the mean time, the NSROC councils continue to work diligently with their communities and the State Government to try and address local and regional environmental challenges in a cohesive and consultative way. The data contained within this report paints a picture of an environment that continues to struggle in the face of urban development pressure, less rainfall and invasive species. As in previous years, our data demonstrates that our creeks and waterways are under significant pressure from development and disturbance and will require careful management into the future to ensure they remain viable ecosystems. While all the councils run extensive bush care and stream remediation programmes, the health of our bushland and waterways remains a strong concern.

Our efforts regarding waste management are providing real and impressive results. More waste (including the green waste stream) is being recycled than buried in landfills. Through our recycling activities alone we are preventing over sixty thousand tonnes of carbon dioxide going into the atmosphere. We hope to do more work in this area when alternative waste management technologies become more freely available. All of the NSROC councils continue to audit their own water and energy usage and a number of innovative schemes have commenced to recycle storm water for use on golf courses and sportsfields, and to augment energy supplies through the use of solar panels. Overall water use in the region has declined as residents and industry introduce water saving measures and become more conscious of water wastage.

One of NSROC's main concerns is how we can grow sustainably into the future. The Department of Planning has released the first subregional strategy for the inner north of Sydney and the second, for the north, is imminent. Together they posit growth of over fifty thousand households over the next twenty five years. Such growth will have significant environmental consequences and the lack of a corresponding infrastructure plan and a clear timetable for the strategies' implementation remain significant concerns.

Finally the difficulty councils have in obtaining quality data for the region must be highlighted. With the imposition of rate-pegging, all the NSROC councils are constrained in the amount of scientific monitoring and analysis they can complete. Data on air quality, species monitoring, soil erosion, climate change impacts and environmental related health issues remains unsatisfactory and state or federal assistance is urgently required to ensure we can make the right decisions now and ensure our environmental heritage is maintained for future generations. I commend this report to you as an important step in achieving that outcome.

Pat Reilly
Mayor of Willoughby Council
President of NSROC
18 October 2007

CONTENTS

ACRONYMS

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

Introduction

THE NSROC REGION

The Northern Sydney Regional Organisation of Councils (NSROC) covers a diverse area of 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 produced its third 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. Two years ago, the first regional NSROC SoE report was completed. This year (2006/07) is a supplementary report which builds upon the data reported previously.

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 collation of 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 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 2006/07 ($)	Population of LGA (estimate for 2006/07)	Area of LGA (square kilometres)
Hornsby	38,558,469	151,325	509
Hunter's Hill	2,005,000	13,912	6
Ku-ring-gai	19,146,966	101,083	84
Lane Cove	6,626,237	32,479	10
North Sydney	24,158,806	61,401	10
Ryde	31,954,331	100,350	40
Willoughby	25,253,494	65,029	23
NSROC Total	147,703,303	525,579	682

Figure 1: Total Expenditure on Environment by council 2006/07

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 socio-economic data sets and information.

CONSULTING WITH OUR COMMUNITIES

In 2006 Hornsby Shire Council carried out a Customer Service Review. The recommendations of the review are being progressively implemented. Community panels have been established as a method of receiving improved feedback from the community. Council also conducted four Open Forum meetings across the shire to give residents an opportunity to raise issues with councillors and senior staff.

Meanwhile Ku-ring-gai Council has continued to work and consult with their community on town centre planning, following its exhibition and adoption of plans for six centres: St Ives, Turramurra, Pymble, Gordon, Lindfield and Roseville in 2006. Council staff have developed an email list of some 4000 household and business stakeholders in these centres, and provided regular email updates on progress. Council will be seeking further detailed consultations and feedback, mostly by email, about these centres, including needs for future parking during Spring 2007.

Lane Cove Council formalised its approach to consultation this year with the adoption of a new Consultation Policy and Methods Guide. These recognise that there are many forms of consultation, and it is important to use methods that are appropriate to the topic. The new documents were first utilised in relation to Council's application for a Sustainability Levy and Major Projects Strategic Plan, which included a Deliberative Poll of 400 ratepayers, emails to all members of Council's e-newsletters, a website exhibition, a staffed exhibition in the Lane Cove Plaza, briefings to Community Leaders, static public exhibitions at the Council Administration Centre and Libraries, letters to adjoining residents (Major Projects Strategic Plan) and advertisements in local newspapers.

North Sydney Council provides residents, students, workers and property owners within the LGA with opportunities to participate in decision making on issues of both present and long term interest in their community. Recent topics include environmental sustainability and the use of cultural and recreational resources in the North Sydney LGA. Each consultation is planned with reference to current consultation methodology and designed to make the process as beneficial as possible for both community and Council.

CASE STUDY

Hunters Hill Council – Sustainability Plan

During 2006/2007 Hunters Hill Council has been developing a Sustainability Plan for the Local Government Area. The development of the plan has been made possible due to the receipt of grant funding from the NSW Environment Trust as part of the Urban Sustainability program.

The Hunters Hill Council Sustainability Plan aims to identify and develop processes that will enable the integration of environmentally sustainable practices into the day-to-day activities and operations of Council and the community. It will provide a vision for how Council can move Towards a Sustainable Hunters Hill.

The objectives of the Sustainability Plan are to:

- Build the capacity for Council and the community to understand and implement sustainable practices.
- Produce a set of Key Performance Indicators to measure environmentally sustainable performance that can be integrated into the existing Hunters Hill Council Strategic Management Plan.
- Create a measurable, transparent and accountable sustainability planning and reporting framework for Council to adhere to.
- Incorporate enhanced participation and effective involvement of the community and other relevant stakeholders in decision-making and implementation of sustainability.
- Integrate economic, social and environmental dimensions of sustainability in a balanced manner.

The Sustainability Plan incorporates and builds on previous goals and strategies developed in Council's Social Plan 2005-2009 and Cultural Plan. The Sustainability Plan will inform Council's strategic planning process across a range of functions via Council's 10-year Strategic Management Plan.

City of Ryde's numerous community consultation committees have been formed to cover many important issues that impact on the community including environment, transport, development, health, equity and heritage. City of Ryde takes pride in its level of community consultation for development applications and in May 2007 the redevelopment of the Top Ryde shopping centre went out to community consultation and gained overwhelming support from local residents. This development will support the Ryde community through encouraging sustainable local business, improving facilities for residents and increasing the overall ambience of the region.

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.

Some of the projects undertaken throughout the region in 2006/07 are as follows:

In April 2007 Hunters Hill Council established the Sustainability and Biodiversity Advisory Committee (SaBAC). The committee is a consultative forum involving community members, Councillors and Council staff. The committee functions as an innovative driver for the change of Councils strategies and initiatives towards a sustainable Hunters Hill.

Ku-ring-gai Council ceased mowing the centre island of Wallalong Crescent, West Pymble as part of the Wallalong Streetcare initiative. Since its subdivision in the 1960s, the space had been cleared, mown and planted, but some remnant trees shrubs and grasses remained. Council felt that the grasses were an important seed source for local

Hornsby Shire Council – Earthwise

Hornsby Shire Council is leading the way in which NSW local governments are providing assistance to residents to reduce their individual carbon and water footprints. Working with a service provider on a cost neutral partnership basis, the Earthwise at home residential energy program is grounded in the evaluation of Council's previous energy and water programs, the NSW Learning for Sustainability Plan, the National Australian Built Environment Rating Scheme (NABERS), and national and international research.

Council provides three different services that increase peoples' capacity to be active participants in the move towards sustainability and bring about a reduction in community greenhouse gas emissions and potable water use.

The first service is the retrofitting of energy and water savings devices in residential homes and includes a NABERS performance rating. This service is free and available to all residents.

The second is a comprehensive workshop series which provides behavioural and technical advice from guest speakers on heating and cooling the home, solar hot water and solar power. All are focused on reducing the ecological footprint and individual household goals for the future.

The final service is the provision of financial assistance to install insulation ($500 x 60 households), solar hot water ($750 x 46 households) or solar power ($4,000 x 10 households).

Hornsby Shire Council helps residents reduce their carbon footprint

CASE STUDY

Bushcare sites. Support from local residents was canvassed and where possible Council spoke to each resident, a couple of whom even agreed to remove the weeds opposite their houses. Council believes it is possible to restore the Streetcare site to a self-sustaining native plant community which, if healthy enough, will resist weed establishment. An exciting development and tribute to the resilience of the site, has been the recent discovery of a rare plant, *Darwinia biflora*. This small shrub is listed as vulnerable under the NSW Threatened Species Act 1995 and the Federal Endangered Species Protection Act, 1992. The species is restricted to ridge tops in the northern suburbs of Sydney and has been mostly lost to the pressures of development.

Lane Cove Council's Sustainability Advisory Committee formed in November 2005 worked with Council to ensure it was working through the actions from the Sustainability Action Plan. The Committee during 2006/07 was consulted by Council on a number of initiatives such as the proposed Sustainability Levy (now approved) and the setting of appropriate Greenhouse Gas Emission Reduction targets for both the Council and the community. These targets have now been adopted and Council will continue to keep the Committee engaged in sustainability initiatives being undertaken.

North Sydney Council engaged the community in sustainability with the hosting of a community energy forum, a rainwater tank information night, bushcare programs such as Adopt a plot and Streets Alive, and school education programs such as Eco-snap shot days and Stormwater and Bushcare adventures.

Each year the City of Ryde rolls out numerous environmental education programs for community action and positive behavioural change including programs tailored to schools through the Ryde Environmental Education Network (REEN) and Culturally and Linguistically Diverse Groups (CALD). Creating partnerships and fostering joint initiatives between Council and external environmental education institutions is of high priority and in 2006/07 a continuation of the Australian Conservation Foundation (ACF) GreenHome partnership occurred with six participants from the original course undergoing an intensive 'Train the Trainer' program. Council has also been working with local businesses such as Eden Gardens and Gardens Centre where community environmental workshops such as World Environment Day celebrations were held. Other programs include environmental 'wine and cheese' nights, catchment tours and community forums, and movie nights on global warming and other topical issues.

Willoughby City Council has supported the formation of North Shore Climate Action, a local community group advocating action on climate change. Its aim is

to get residents in the North Shore to switch to green power as one of the simplest and most effective ways to reduce household greenhouse gas emissions. North Shore Climate Action and Willoughby City Council along with Hills Endless Solar have been promoting green power through the Switch and Ditch competition, offering one lucky household which has made the switch to green power a solar hot water system.

Willoughby's Sustainability Street program is about residents getting together to create sustainable homes and communities. While getting to know their neighbours, participants learn how to save both money and the environment. Each participant's goal is to reduce waste to landfill by more than 50 per cent, save $500 a year through energy conservation and reduce water usage by up to 60,000 litres a year. The program is run with groups meeting to learn about sustainability, share their knowledge and experience, come up with some ideas for local action and most importantly enjoy each other's company. Groups are taking on projects such as nature strip planting and conducting their own workshops on various issues including no dig gardens, chickens and carbon trading. Two of the groups joined forces and successfully obtained a grant from the Environment Trust to develop a sustainable living collection for Artarmon Library.

CORPORATE ACTION

The northern Sydney councils have progressively adapted their corporate management structures to accommodate the move towards sustainability. Each council has adopted a number of mechanisms to ensure that 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.

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.

Hornsby Shire Council has a strong history of leading its community by example to progress sustainability. To this end Council developed the Hornsby earthwise program for corporate and community initiatives. Council has endorsed an approach to sustainability reporting aligned to the Global Reporting Initiative (GRI) and its principles because it provides a balanced view of internal performance management, promotes quality governance, strengthens stakeholder engagement, and demonstrates higher levels of performance. The GRI has been incorporated into Council's Management Plan and Annual Report. The Global Reporting Framework encourages disclosures on sustainability performance aligned to social, economic and environmental considerations.

At Hunters Hill Council, the aims, objectives and goals of the Hunters Hill Council Sustainability Plan are to be integrated into Council's ten-year strategic management plan. The Sustainability Plan will supersede the environmental management plan and will integrate the goals and objectives of the social and cultural plan developed in 2005 and 2006 respectively.

Ku-ring-gai Council conducted a Corporate Sustainability Survey in December 2006 which included open-ended questions on sustainability in the workplace. The survey was conducted using electronic and paper surveys and was open from 14 December 2006 to 8 January 2007. One hundred completed surveys were returned from approximately 413 staff – a response rate of 24 per cent. It sought information across economic, social, environmental and governance aspects of Ku-ring-gai Council. The survey determined broad trends on: sustainability in practice; staff understanding of

The City of Ryde 'Weedbusters' stall

City of Ryde – Environmental Education Team

City of Ryde's long standing Environmental Education Team was formed to exchange ideas on how to promote and incorporate sustainability into Council's daily activities, and to raise community environmental awareness. The team meets monthly and comprises of members from a range of areas within the Council.

Sustainable work practices adopted in 2006/07 include a staff transportation survey and assistance policy, and an increase in the uptake of hybrid cars for fleet vehicles. On World Environment Day, Council held workshops for staff called the 'World Environment Day Games' to raise awareness on how staff can make a difference in the home and office. The games resulted in a huge staff turn out with many making a commitment to changing their behaviour through an ecological footprint tool. In addition to this, staff learnt how to make natural cleaning products and found out about native and weed species in their local area for more environmentally conscious gardening.

The Environmental Education Team also runs promotions throughout the year for Council staff and the community including environmental competitions, walk to work day activities, and sustainability stalls such as the 'Weedbusters' stall, an education stall on native plants and introduced species, at the Granny Smith Festival each year.

To complement the Environmental Education Team and reduce the corporate environmental and social impact occurring from corporate activities, a Sustainable Procurement Policy was recently created and adopted by council. The policy tackles the social issues to be considered in purchasing such as fair trade and producer responsibility. It also encourages extensive investigation into environmental considerations including carbon emissions, waste and toxic chemical production from procured items as well as raising local business support. The Sustainable Procurement Policy will be integrated into council practices through corporate training sessions and promotions aimed at staff to increase awareness. These measures will encourage the effective implementation of the policy and measurable outcomes.

City Of Ryde also works extensively to reduce its corporate footprint by lowering overall water and energy consumption through a variety of policy and action measures as well as actively pursuing cut backs in greenhouse gas emissions created through corporate activities.

CASE STUDY

corporate sustainability; and attitudes and receptivity to changing Council's internal processes. This information will be used to develop a strategic Corporate Sustainability Plan.

In 2007 North Sydney Council commenced a two year program overseen by the ICLEI. The program is called Triple Bottom Line Capacity Building and provides a structured method of incorporating TBL principles, and more broadly sustainability, into the everyday operations of the Council.

A comprehensive gap analysis conducted by the ICLEI in March 2007 has identified a number of actions to be undertaken to achieve the program's objectives. An action plan has been developed and the Council is progressing towards achieving two integrated streams – a decision making process and a reporting process.

Willoughby City Council is incorporating the objectives of the Willoughby City Strategy, a 15-year planning document, into its corporate management plan. An example of some of the actions being implemented include:

- Promoting rainwater tanks through the development control process by offsetting the need for on-site detention tanks;
- Encouraging car sharing schemes in major development projects;
- Implementing behavioural change programmes such as Sustainability Street;
- Implementing Community Grants;
- Providing programs that meet the needs of our local community e.g. Willoughby Community Men's Shed.

City of Ryde recently adopted a Sustainable Procurement Policy to complement the Environmental Education Team and reduce the corporate environmental and social impact occurring from corporate activities. The policy tackles the social issues to be considered in purchasing such as fair trade and producer responsibility. It also encourages extensive investigation into environmental considerations including carbon emissions, waste and toxic chemical production from procured items and local economic considerations such as raising local business support. The Sustainable Procurement Policy will be integrated into council practices through corporate training sessions and promotions aimed at staff to increase awareness. These measures will encourage the effective implementation of the policy and measurable outcomes. City Of Ryde also works extensively to reduce its corporate footprint by lowering overall water and energy consumption through a variety of policy and action measures as well as actively pursuing cut backs in greenhouse gas emissions created through corporate activities.

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. The Metropolitan Strategy, announced by the State Government in 2004, has set growth targets for the whole of Sydney and divided these targets into regions. The proposed growth target for the NSROC region is 51,000 households which equates to approximately 130,000 people over the 25 years of the Metropolitan Strategy. The first iteration of the Strategy, released in December of 2005 and titled 'City of Cities' identified seven strategies to guide the estimated growth of 1.1 million people over the Strategy's 25 year time frame. These are economy and employment; centres and corridors; housing; transport; environment and resources; parks and public places and implementation and governance. The second iteration; the more detailed descriptions of where growth would occur, where jobs would be created and how such growth would be sustained, is scheduled to appear in subregional strategies to be released in late 2007 and early 2008.

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

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

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

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

While strongly supporting a regional strategic planning process for Sydney's growth, NSROC has consistently expressed concerns regarding the limited amount of infrastructure provision identified in the overall Metropolitan Strategy and the draft subregional strategy that has now been released. NSROC's concern is that the infrastructure is inadequate to

sustainably address the growth envisaged in the strategy, particularly as growth targets are identified for a 25 year period, but infrastructure is only identified for the next 10 years under the SIS. The NSROC councils remain in the invidious position of having to plan for 30 years of population growth with the commitment of only 10 years worth of infrastructure.

NSROC is also concerned that the environmental actions identified in the Inner North Subregional Strategy are insufficient to protect the environmental heritage and ecological communities of the region. The Subregional Strategy does not have an implementation plan which identifies responsibilities, performance indicators, budgets and timetables and thus doubts remain regarding its effective implementation. It is hoped that revision of the Draft Inner North Subregional Strategy and the imminent release of the North Subregional Strategy will allay these concerns.

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

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	300	0	550	0	0
Lane Cove	45	11	183	0	133
Hunters Hill	20	0	34	1	275
Ryde	277	24	888	0	74
Ku-ring-gai	70	0	674	1	59
Hornsby Shire	160	40	1282	10	357
Willoughby	257	48	554	1	37
NSROC region	1129	123	4,165	13	935

Figure 3: Number and type of development applications (DAs) in the NSROC area, 2006/07

Figure 4: Number of new dwellings in the NSROC region, 2006/07

Council	Number of New Dwellings
North Sydney	20
Lane Cove	10
Hunters Hill	16
Ryde	7
Ku-ring-gai	126
Hornsby Shire	640
Willoughby	25
NSROC region	844

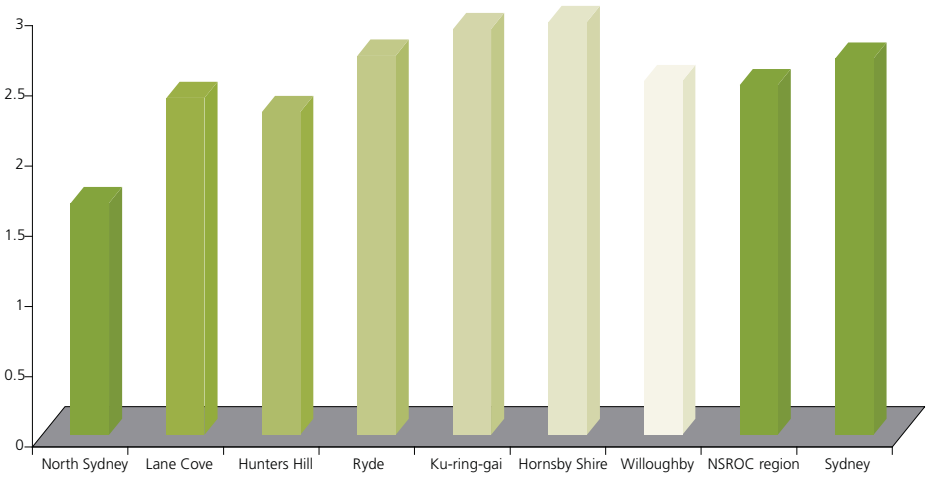


Figure 5: Average number of people per household in the NSROC region

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	44.71	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	0.23	0.31	41.81	4.60	8.85	No data*	2.88	13.72	14.08	13.52
Willoughby	2.38	4.29	0.35	20.10	49.35	18.21	4.46	0	0.01	0.85

Figure 6: Percentage of land use by LGA in the NSROC region, 2006/07

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. The actions of the State Government in responding to the pressures of development have been described in the preceding section. A key initiative has been the development of the Metropolitan Strategy to guide growth in Sydney over the next 30 years. NSROC and the seven councils have been working closely with the Department of Planning in the development of the Strategy and the corresponding subregional strategies. The NSROC councils have also procured a number of reports to answer key issues associated with the economic, environment and social development that the anticipated population 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 has also completed a Northern Sydney Sub-Regional Planning Strategy, which provides overarching direction and policies for development at a regional level, as well as identifying infrastructure needs and opportunities over the next 30 years. The NSROC Northern Sydney Sub-regional Planning Strategy covers the period 2004 – 2031 and sets regional and council specific housing and employment targets at 10 yearly intervals for the period of the Metropolitan Strategy as well as identifying key infrastructure projects which will assist in making the proposed population growth achievable. This document has been exhibited by the NSROC councils and adopted by the NSROC Board and can be viewed at www.nsroc.org.

The Sustainable Building Index (BASIX)

Introduced by the NSW Government, BASIX is an online program designed to ensure homes are built to be more energy and water efficient. BASIX uses information such as site location, house size, type of building materials and fittings for hot water, cooling and heating and compares the design performance against energy and water reduction targets. The design must meet these targets before a BASIX Certificate can be printed and a new development approved. Every development application for a new home must be submitted to 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.

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 in February 2007 approved a Sustainable Building element for insertion in the Dwelling-House, and Low, Medium, Medium/High and High Density Multi-Unit Housing, Business Lands, Rural Lands, River Settlements, Brooklyn and Dangar Island Development Control Plans (DCPs). The element promotes development that reduces potable water and energy consumption and results in the improvement in the thermal performance of a residential building. The element also includes both applicant and Council responsibilities concerning BASIX requirements at the design, lodgement, assessment and determination stages of a development proposal affected by BASIX. Council also endorsed an erratum for insertion in Council's Exempt and Complying Development DCP to identify BASIX requirements.

POPULATION DISTRIBUTION

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

The Challenge of Population Growth

Population growth and the associated planning for increased development is the major pressure facing the region in environmental terms. Historical evidence repeatedly demonstrates that there is a strong correlation between urban population growth and a reduction in the ability to protect 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 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). 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 data from the ABS for 2005 indicated a pronounced dip in population growth, however the data for 2006 indicates that for the first time in six years that the rate of population growth is increasing from the previous year.

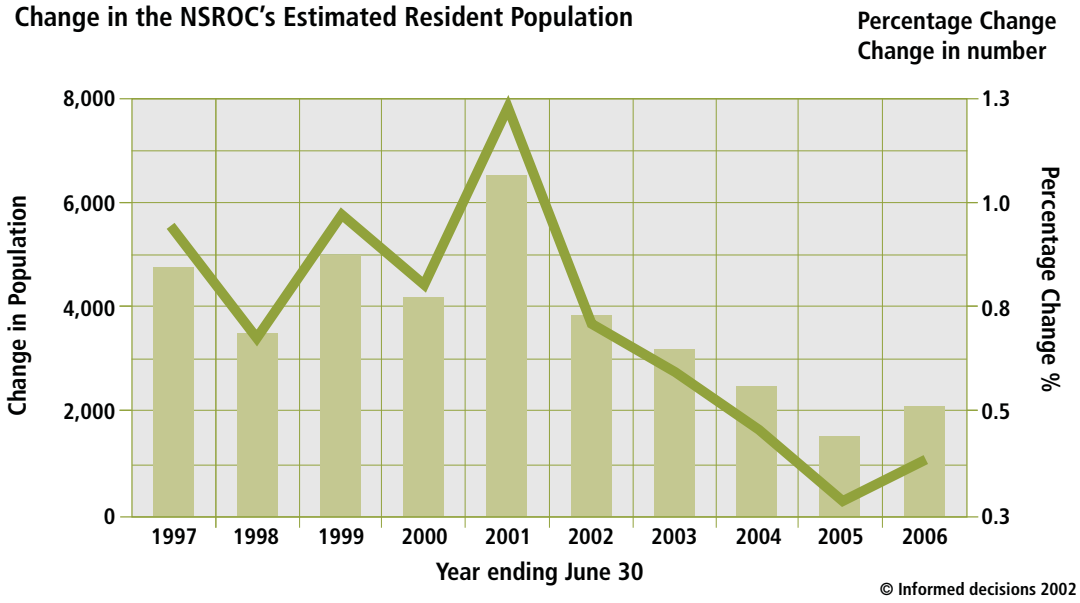


Figure 7: Change in NSROC's estimated resident population for the year ending June 30, 2006

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 subregional Strategies are being produced by the Department of Planning covering the NSROC region. 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 51,000 new households and over 60,000 new jobs over the next 25 years. The Inner North Subregional Strategy has already been exhibited by the Department of Planning and each of the NSROC councils and NSROC itself sent in a submission raising a range of concerns about the strategy. The chief areas of concern were the absence of adequate infrastructure provision to accommodate anticipated growth, the absence of an implementation plan attached to the strategy giving clear timelines and responsibilities for delivery, and a lack of detail regarding key issues such as housing affordability, environmental sustainability and public transport provision.

It is anticipated the North subregional strategy will be released in late 2007. While local government has been consulted with in the process of developing the subregional 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.

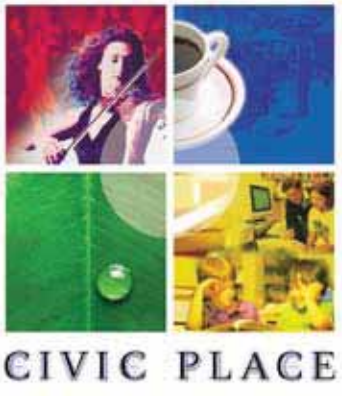
Although the process is not yet complete, it is anticipated that a regionally planned approach to population growth, rather than ad-hoc or simplistic approaches used previously, will greatly assist in reducing the impacts from population growth. In a report on the environmental impacts associated with 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 also completed their own 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

Willoughby City Council – Civic Place



Willoughby has outgrown its existing civic facilities and plans to redevelop the 1.2 hectare site in the centre of Chatswood to provide a new library, theatre, concert hall, and exhibition hall facilities which incorporate sustainable design. The approval of the Development Application (DA) marked an important milestone in the progression of this important community project. The approval of the Civic Place DA is the culmination of six years of planning and community consultation, which has ensured the project has remained community-driven and transparent.

As well as providing a suite of arts venue to the under-resourced Sydney arts landscape, a safe community gathering, eating and shopping place and a library three times larger than the current Willoughby City Library, Civic Place will greatly encourage economic growth for Chatswood and the North Shore. Civic Place also responds to Sydney's Metropolitan strategy by providing a range of arts facilities that accommodate audiences and performers at every level.

The sustainable design aspects of Civic Place include targets to achieve 50 per cent energy efficiency from the existing building, save 90 per cent of water over a conventional building, material selection to improve indoor environmental equipment, use of natural light, recycling of demolition and construction waste, integrate with public transport and plant locally endemic trees and shrubs. Demolition of the existing buildings will commence early 2008, with completion scheduled for 2010.

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	67	67	1
Lane Cove	67	67	1
Hunters Hill	45	45	0
Ryde	14	59	0
Ku-ring-gai	92	80	0
Hornsby Shire	235	235	0
Willoughby	152	152	0
NSROC Region	672	705	2

Figure 8: Aboriginal Sites in the NSROC area, 2007

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.

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

Hunters Hill Council is currently upgrading the Great North Walk in Boronia Park. A part of the works involved the protection of a significant Aboriginal site. During site assessment a number of flakes of banded chert were found adjacent to the site. This material is not found within the Sydney Basin and was identified as having its origins on the south coast. Although Sydney's Aboriginal sites are well documented, the processes of erosion can reveal new findings. These findings and substrate mobility have implications for reviewed management strategies.

CASE STUDY

The Aboriginal Heritage Office

The Aboriginal Heritage Office (AHO) is a partnership of Ku-ring-gai, Lane Cove, North Sydney, Manly, Pittwater, Warringah and Willoughby Councils. Established in 2000, the AHO works to protect irreplaceable Aboriginal heritage sites for the generations to come through building Aboriginal heritage management frameworks at local Government level that cover site management, education and community liaison.

Part of the work of the Aboriginal Heritage Office is to monitor Aboriginal Sites on a regular basis to ensure their protection. Another key role is to give Aboriginal and non-Aboriginal people within these Council areas an avenue of approach to discuss issues or concerns they may have. The AHO is in direct contact with the Metropolitan Local Aboriginal Land Council and its many resources.

Education and training are crucial components of site protection, and the AHO provide a Schools Program to help children appreciate the unique heritage of the Aboriginal people. Guided walks, presentations and Koori Games are offered free to all schools in the participating Councils. Staff training is also an on-going activity.

In 2006-2007 the AHO provided advice on over 200 private development applications as well as advice and input into many Council initiated works and activities, such as walking track upgrades, park and reserve management, and hazard reduction burns.

In 2006-2007 the AHO completed a number of additional projects, including Foreshores Aboriginal Heritage Promotion, Sydney Northern Region, a Federal Government funded study on the opportunities and constraints of promoting Aboriginal sites through guided and self-guided walks in foreshore areas, as well as NSW Heritage Office funded projects reviewing site conservation and signage, updating Council site management reports, improving data and site card management and the development of the AHO's website (www.aboriginalheritage.org).

In the current financial year the AHO has successfully gained Federal funding to establish volunteer Site Care groups across participating Councils. The AHO will continue with its site management programs, community education programs, staff training and provide assistance with development assessment.

Aboriginal mural at Flat Rock Gully by artist Shane Haurama

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," 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.

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. Hornsby Shire Council is currently undertaking Heritage Review Stage 4 which involves a review of the heritage significance, including condition, of the heritage listed trees in the Shire. The review also involves the correction of anomalies within existing listings and conversion of the hard copy heritage inventory sheets to an electronic database to be made available through Council's on-line service portal.

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.

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

Lane Cove Council: contains 417 heritage sites with one conservation area. During the last year Council has updated the working draft map indicating items of landscape significance.

North Sydney Council: contains 25 heritage conservation areas with 1,466 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.

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 9 places within Ryde listed on the State Heritage register. Heritage groups in the area include Ryde District Historical Society and Brush Farm House Historical Society.

Willoughby City Council: contains 230 listed items, which include 11 items on the State Heritage Register and 219 items of local environmental heritage. The Willoughby Local Government Area has 12 Conservation Areas with approximately 4,100 properties. The Willoughby Heritage Advisory Committee continued to meet throughout 2006/2007 to discuss policy and information issues. The Committee is comprised of Councillors, Council staff, representatives from the committee and local heritage organisations.

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. Recent successes in the NSROC region include the City of Ryde's completion of conservation works on Brush Farm House. The council was recently awarded the Keep Australia Beautiful Sustainable Cities Heritage Award for its conservation work associated with the house. In continuation of the focus of Brush Farm Estate a Local Heritage Assistance Fund was established by Council to encourage positive work on heritage items in the City of Ryde. The fund is $20,000 and will assist in the reinstatement of original or missing items on heritage buildings, traditional colour schemes and repair of original fences. Six applications for the fund have already been received for consideration, and the work will be undertaken within the next year. In addition to this, City of Ryde also established a $6,000 heritage interpretation grants program for the Museum Studies students of Macquarie University.

Willoughby recently gazetted amendments to the Willoughby Local Environmental Plan 1995, adding one item to the State Heritage Register (two reservoirs) and twenty-two local heritage items. These local items include not only houses, but also the Willoughby City Council depot, ruins, shops, flats, clubs, a clock tower, park and tidal pool. Other heritage activities include:

- The recent commission of a study on the Architect Frederick George Castleden's major works in the Willoughby area and throughout the State of New South Wales.
- The theme for the 2007 National Trust Festival was 'Cultural and Natural Landscapes'. There were four community and five Council sponsored activities/events held during the Festival.
- In March 2007, the Council's Heritage Awareness webpage came online. This site is an ongoing project and contains information on local people, architecture, aboriginal heritage, local history, heritage resources, arts and entertainment along with links to other heritage related websites.

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.

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

North Sydney Council – Saving Graythwaite Estate

Graythwaite is a 2.6 hectare hospital that is the subject of a current court case in the NSW Supreme Court. The Estate features a heritage listed Victorian mansion built in the mid-19th century, one of few remaining in Sydney. The mansion is no longer used and has fallen into disrepair. Sir Thomas Dibbs entrusted Graythwaite to the Crown as a war repatriation hospital in 1915. About one third of the site is still in use as a hospital.

In August 2007 the Supreme Court ruled that the trust had failed. It now must be decided how to carry out the intent of the trust in a different way. NSW Health is presenting a case that the property should be sold and the proceeds used on another site. North Sydney Council maintains that the trust can be fulfilled on the site of Graythwaite, but with a different healthcare provider. The local federal member committed funding in October 2007 for the RSL to take over the trust. A decision is unlikely before early 2008.

The grounds had been neglected until 2000 when North Sydney Council reached agreement with the current custodians to look after the gardens. North Sydney residents have an information website. They meet in the gardens every Sunday and have contributed more than 5000 volunteer hours since November 2000.

CASE STUDY

In November 2006 the State Government released the Urban Transport Statement (UTS) which proposed new infrastructure, strengthening of eighteen transport corridors and a new Centre for Transport Planning and Product Development. While the UTS does include a significant and welcome upgrade of Victoria Road, this has not been comprehensively identified in the Inner North Subregional Strategy released by the Department of Planning in July 2007. Instead the Inner North Strategy reiterates the completion of the Lane Cove Tunnel and the Epping to Chatswood Railway Link which is near completion.

In order that traffic does not become an overwhelming environmental issue it is hoped that the State Government will take responsibility for committing to planning adequate infrastructure to service the growth which councils are required to provide over the next 25 years. A key component of the Metropolitan Strategy announced by the State Government was to have been the completion of the North West Railway Line to connect the new growth areas in the North West with the rest of the city. This intention is also reflected in the State Infrastructure Strategy (SIS) released in May 2006. Current debate about the viability of key components of the SIS (such as the North West Railway line) and the changes made by the Government to previous guaranteed projects (such as the truncation of the Epping to Chatswood Railway line) further underline the concern that regions are being forced to accept high levels of urban consolidation in the absence of adequate transport infrastructure provision. NSROC has already identified key regional transport infrastructure requirements *(NSROC Sub-Regional Planning Strategy 2006-31)* it sees as necessary to enable further residential consolidation of the scale envisaged in the Metropolitan Strategy without environmental and economic impacts becoming overwhelming. These are:

1. The Completion of the Parramatta – Chatswood Rail Link;
2. The Completion of the M2 – F3 Orbital Link;
3. A Hornsby to Newcastle High Speed Rail Link;
4. A Bus-only Transit Way between Chatswood and the Brookvale/Dee Why Centre;
5. Integrated public transport to Macquarie Park;
6. A second Harbour Bridge Rail Crossing;
7. A pilot Project to introduce Demand Responsive Transport, public transport services that complement and meet service gap areas under the new Principal Bus Contractors arrangements;
8. The Creation of a transport strategy for the Victoria Road corridor, to address private vehicle and public transport;
9. Improvements to major intersections on State arterial roads (e.g. flyover at the intersection of Boundary Street and Pacific Highway and a flyover at the Archibald and Penshurst Street);

CASE STUDY

Lane Cove Council – The Lane Cove Tunnel

East bound traffic coming out of the Lane Cove Tunnel

The Lane Cove Tunnel opened on 26 March 2007 for an initial one month toll free period. It was anticipated that the Tunnel would accommodate approximately 121,000 vehicles per week within 12 months of operation. To date the Tunnel is being used by approximately 50,000 vehicles per week day, a figure well below the modelling completed on behalf of the tunnel consortium. While the Tunnel has undoubtedly assisted east-west traffic flows across the region, further consideration needs to be given to how this expensive piece of infrastructure can be fully utilised. Due to the low number of vehicles using the Tunnel at present the air quality impacts have not reached the critical level where they become a significant concern. The NSROC position remains that the Lane Cove Tunnel should have in-tunnel filtration for air quality impacts now and into the future. Further issues regarding regional and local traffic flows may eventuate when additional planned surface road alterations and narrowing occurs and as flow-on impacts from tunnel traffic become more apparent with greater usage.

10. Retention of existing ferry services in the region and exploration of possible extension of the ferry services;
11. The Creation of a Pacific Highway Corridor Strategy to relieve growing pressure on this major North-South artery; and
12. A strong focus on, and commitment to, active transport (bicycle and pedestrian) programs and infrastructure such as the proposed HarbourLink cycle pedestrian way to connect the existing off-road network on the Lower North Shore with the Harbour Bridge. This would enable safe mass commuting by bike.

The current approach of the State Government is to connect NSROC urban centres with the transport network however the network is already under significant capacity constraints. These are in part being addressed through the Railway Clearways Programme and the Bus Reforms, however local and regional data consistently shows increases in private vehicle use, longer travel times, and major infrastructure capacity failures. The NSROC region looks to the Metropolitan Strategy to identify commitments for public transport infrastructure over the next 30 years.

While northern Sydney has substantial infrastructure for road, rail and some other transport services, that infrastructure will not be able to serve the Region's increased demands due to urban consolidation, sustained competitive economic growth and cross regional transport (particular Western and Central Coast through traffic) without a long term plan for maintenance and upgrades to keep pace with demand. New transport infrastructure proposals should proceed on the basis of a close, consultative partnership with local Government and communities.

The Impact of Traffic

Discussions with each 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)*

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 recorded 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)*

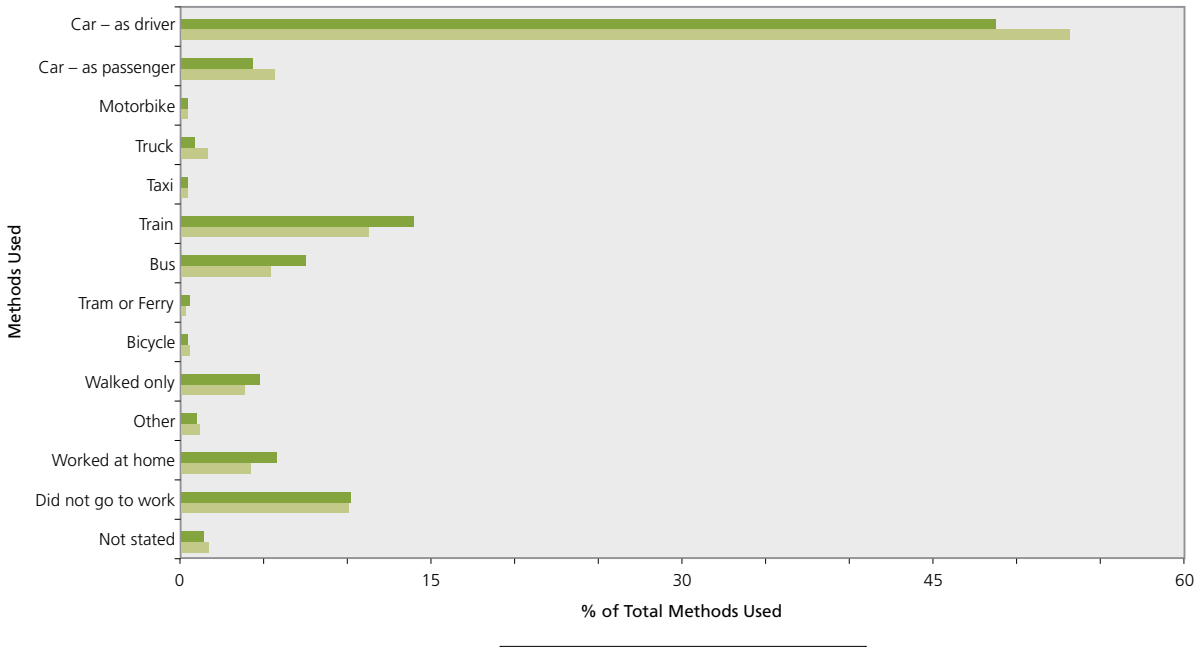


Figure 9: Mode of travel to work, in the NSROC region and the Sydney Statistical division, 2001

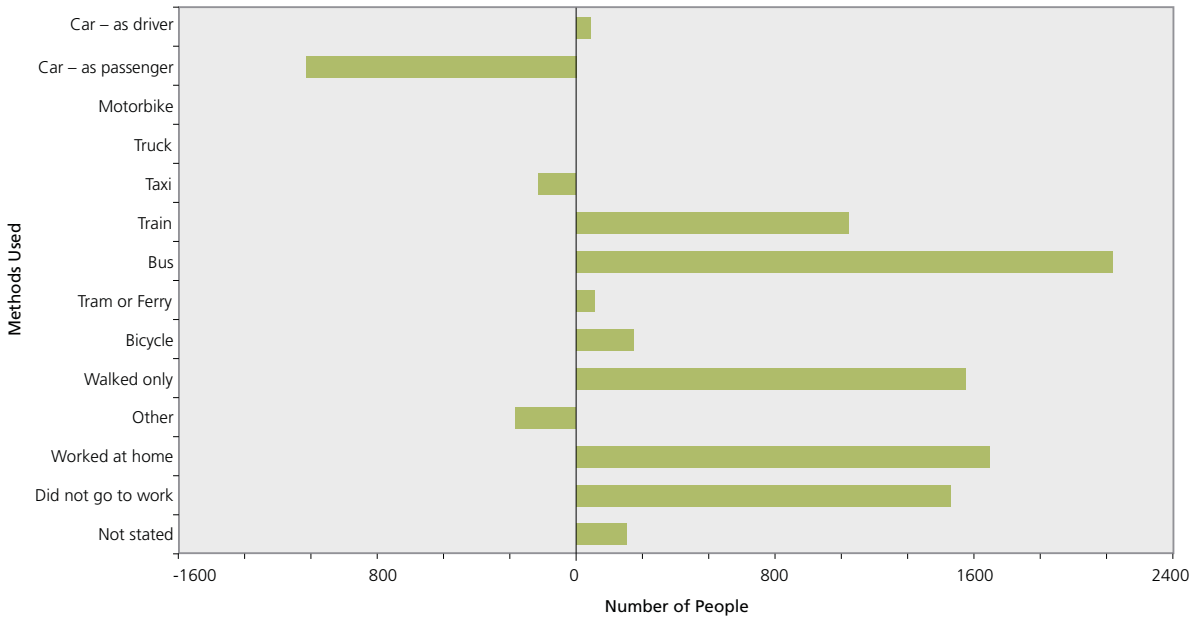


Figure 10: Change in mode of travel to work in the NSROC region, 1996 to 2001

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

Figure 11: Daily traffic volumes at key locations in the NSROC region 2006

Council	Car Ownershp per capita 2006/07	Number of off-road vehicles per capita 2006/07
North Sydney	0.46	0.07
Lane Cove	0.3	0.04
Hunters Hill	0.41	0.07
Ryde	0.54	0.06
Ku-ring-gai	0.59	0.08
Hornsby Shire	0.48	0.07
Willoughby	0.47	0.07
NSROC	0.46	0.07

Figure 11: Car ownership per capita in the NSROC region, 2006/07

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. However this key transport link, which forms the platform for public service transport provision to the new release areas in the North West has been the subject of some conjecture in the media regarding whether it will ever be built.

The State Government bus reforms are also underway, however councils have not had a significant role in the development of the new bus contracts. 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.

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.

As part of the planning for the Gordon town centre, Ku-ring-gai Council has been planning a significant upgrade to the existing bus interchange area off Henry Street. The upgrades include a larger capacity bus area, bus set-down area, new bus shelters which incorporate lighting, timetables and seating, a new kiss and ride area and a new taxi rank. Footpath improvements and the creation of a small urban park will provide pedestrian amenity at

CASE STUDY

North Sydney Council – Cycling North Sydney

North Sydney Council has produced an updated Cycling North Sydney map and helped develop regional walking maps including the Harbour to Spit Walk, the Harbour Bridge to The Great North Walk and A Harbour Circle Walk. These maps have been layered on top of the Sydways street directory and importantly 'ignore' Council boundaries, showing the active transport links into the surrounding Council areas. North Sydney Council is committed to encouraging an active lifestyle for our residents and visitors. Cycling and walking are both wonderful ways to move around this beautiful part of Sydney. In addition, walking and cycling can help to reduce traffic congestion, greenhouse gas emissions, and provide health benefits from exercise.

The cycling map was developed in close consultation with the Bicycle Committee, Bike North and the North Shore Bicycle Group. The cycling map was developed to compliment Council's North Sydney Bike Plan, which has identified existing bicycle paths and prioritised funding for the construction of new bike paths. Since 2002, Council has installed approximately 21.9 kilometres of a planned total of 26.2 kilometres of on and off-road bike paths. Approximately 6 kilometres were completed in 2006/2007. As well as the marked cycle routes, the cycling map highlights unmarked useful cycling routes, which are preferred travel paths based on flatter topography and smaller traffic volumes.

The regional walking maps, which are now up to version three, have been developed by the Walking Volunteers with the assistance of Councils and the Department of Planning. Extensive consultation was undertaken with the North Sydney Pedestrian Committee.

the station entrance, and would make strong pedestrian connections to retail and commercial areas. Proposed new traffic signals at the intersection of Pacific Highway and Ravenswood Avenue and alterations to traffic flows at the intersection of Pacific Highway and St Johns Avenue should reduce delays to bus services, while upgrades to the passenger facilities of the bus interchange will improve commuter comfort when transferring between bus and rail.

The City Of Ryde has developed an Integrated Transport and Land Use Strategy (ITLUS). This important Council initiative will inform Ryde Council policy and lead towards an improved transport future for the City Of Ryde. Implementing the strategy will assist Ryde in achieving a more sustainable, accessible, amenable, equitable, safe and integrated transport and land use system balancing social, environmental, health, economic and strategic objectives. The ITLUS has significant strategic relevance to Council and will be used as background information in the preparation of Council's Local Planning Strategy.

To reduce private car travel, Willoughby City Council is improving access to walking and cycling facilities and encouraging use of alternatives to private motor vehicles. Projects include:

- Promoting and improving walking routes by recruiting volunteers to map walking routes to major transport modes. This is part of a major project to identify the existing pathway network and prioritise improvements and maintenance.
- Regional walking route signposting has been erected throughout the Local Government Area.
- Christmas Transport Access Guides were prepared and widely circulated within the Chatswood CBD shopping precinct to assist with Christmas traffic control and promote use of sustainable transport modes for shopping trips.
- The 'Car Share' scheme, which allows members to share use of a vehicle, has continued to operate and has expanded to include additional car share 'pods' in Chatswood West and St Leonards.
- The trial of Council's demand responsive 'Council Cab' service has continued with positive feedback from users. The service is a pre-booked, multiple hire transport service.
- New bike routes have been established along Edinburgh Rd, Castlecrag; in Cambridge Lane, Chatswood and in Henry Lane, St.Leonards.
- A major survey of business premises in the Artarmon Industrial Area has been undertaken to explore the feasibility of a shuttle bus service through the area.

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.

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.

CASE STUDY

Billboard advertising on North Sydney Station

North Sydney Council – Dumping. It's dumb

North Sydney, Willoughby, Mosman and Lane Cove Councils have been working together to send a clear and strong message, not only to local communities but, on a regional basis, through a joint advertising campaign, that Dumping is Dumb and will no longer be tolerated. The Councils involved have shared boundaries, transport such as bus routes/train line and regional newspaper distribution. This regional program will be supported by local campaigns implemented by the relevant Councils

The campaign was designed to use core messages used to raise awareness of the significant adverse impact illegal dumping has on the local and broader communities, especially around Multi-unit dwellings (MUDs), a significant portion of which make up the dwelling types within the respective Council areas, particularly in North Sydney, where it is estimated that over 60 per cent of dwelling types are MUDs.

The targeted audience were mostly residents, and since a broad range of people use public transport, this was used as a communication/educational medium to expose the message to the targeted audience on a continuous basis. The promotional materials used were sourced from the Dumping. Its Dumb Resource Kit, developed by the Department of Environment and Climate Change.

Solid Waste Disposal and Recycling

In 2006/07 residents of the NSROC region generated 112,500 tonnes of material which went to landfill. A further 120,690 tonnes of material was recovered through recycling systems and an additional average of 70 kilograms of green waste was recycled for each person in the region. In 2006/07 the amount of material diverted from landfill through recycling and green waste collections was 253 kilograms per person.

In total more waste was collected in 2006/07 than in previous years reflecting the growing population of the NSROC region. However, the volume and percentage of waste being recycled has increased considerably and the total landfill has decreased by 5,894 tonnes in the region since 2005/06. The total of resources recycled has increased by 29,598 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	11,600	9,403	189	153	16
Lane Cove	12,668	5,602	218	173	48
Hunters Hill	2,190	1,900	158	137	26
Ryde	23,019	18,888	229	108	80
Ku-ring-gai	20,881	31,952	193	295	143
Hornsby Shire	31,651	34,735	200	220	94
Willoughby	10,491	18,210	161	194	86
NSROC	112,500	120,690	193	183	70
Total Greenhouse Gas Emissions saved in NSROC region resulting from recycling (using DECC environmental calculator)			**60,414 tonnes of $C0_2$**		

Figure 13: The division of landfill and recycled waste by council within the NSROC region, 2006/07

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, Hunters Hill Council has been conducting educational waste tours to the UR-3R, Alternative Waste Technology (AWT) facility at Eastern Creek for council staff, committee members and local schools in the area. The tours focus on closing the loop on waste, and highlight waste as a valuable resource. Hunters Hill Council has successfully diverted a large quantity of the municipality's mixed solid waste from being disposed of in landfill thanks to the use of this facility during 2007.

Hornsby Shire Council has reduced its domestic material collected going to landfill by two per cent from the previous year. This has been achieved through a variety of strategies including: an electronic waste collection for recycling; two unit block education expo's; mulch and wood chipping days; empty drum collection from rural properties under the drumMuster program; and frequent compost and worm farming workshops. Council also undertook a waste and recycling audit in order to develop future waste reduction strategies.

Ku-ring-gai Council, supported by Veolia Environmental Services and WSN Environmental Solutions have launched a campaign to tackle the problem of illegal waste dumping in the Ku-ring-gai Local Government Area. The campaign consists of increased advertising and education about the impacts of illegal waste dumping, improved surveillance at key sites or 'dumping hotspots' and enhanced reporting mechanisms that will allow the community to play a greater role in assisting Council to catch offenders.

Willoughby City Council and Lane Cove Council recently hosted their annual e-waste event. They received around 726 vehicles loaded with all sorts of unwanted electronic equipment including televisions and monitors, computers, keyboards, VCR's, DVD players, computer mouses, computer cables, scanners, stereo systems, laptops, hard drives, small printers, mobile phones and various other items. Residents broke records recovering a total of 44.4 tonnes; about 15 tonnes more than last year.

The e-waste collected from the Willoughby City Council and Lane Cove Council event is to be processed by PGM Refiners in Australia, using the latest alternative recycling and recovery technologies. PGM Refiners not only treat the hazardous material but also recover recyclable materials. Rather than incinerating – the materials are dismantled and then segregated where they are then subjected to environmentally friendly processing within Australia producing high commodity concentrate for reuse.

In May 2007 Willoughby City Council, North Sydney Council, Lane Cove Council and Mosman Council launched a Multi-Unit Dwelling (MUD) Illegal Dumping Prevention Campaign developed by the Department of Environment and Conservation and for which the councils were awarded a $50,000 grant to develop the regional campaign

The campaign consisted of sending out the clear and strong message that dumping is dumb, illegal and will not be tolerated. Public buses, train stations and local newspapers were used to carry the campaign message Dumping. It's dumb. A 24 hour Hotline was set up to allow residents to report illegal dumping or to find out more information about

CASE STUDY

City of Ryde – New Park Recycling Stations

City of Ryde Council has recently completed the installation of 242 garbage and recycling stations across over 83 parks and sporting fields. Council's outdoor staff working together with its waste contractor, WSN Environmental Solutions have been busy installing the stations over summer. The distinctive signs on these new stations show what can be placed in each bin. The yellow-lid recycling bins accept glass, plastic, steel containers, aluminium cans, paper and small cardboard items. This is the same system as the residential recycling service. All other general garbage is to go into the red-lid garbage bins.

New recycling station at Meadowbank Park

Both bins have limiters in the lid to restrict the bins from being used for household garbage and to prevent contamination in the recycling bins. The recycle bin has a hole in the lid large enough for bottles and cans to go in. There has been an enthusiastic reaction from residents and local sporting groups with our contractors commenting on the high volume and quality of recyclables being collected so far. Public place recycling is a major step toward achieving greater diversion of waste from landfill and helping our environment.

council clean up services. The regional advertising campaign was supported by each individual council undertaking local educational and enforcement programs.

In the first full year of operation of a new three bin waste collection system, City of Ryde has reduced the tonnage of waste sent to landfill by over 7000 tonnes which is equivalent to an additional 23 per cent diversion from last year. This reduction can be attributed to the introduction of a garden vegetation bin, reduction in the size of the waste bin and greater range of recyclables collection in the new commingled recycling bin. In addition, Council has implemented public place recycling in parks and sporting fields and continued successful programs such as the free chipping service for residents and the 'Follow Your Waste' bus tours.

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 Climate Change (DECC) 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	47	38	190	20	6	13	80	12	0	406
Lane Cove	39	4	6	0	5	0	13	0	24	91
Hunters Hill	16	0	0	4	3	0	0	0	0	23
Ryde	120	15	32	1	2	7	19	233	24	453
Ku-ring-gai	279	42	71	0	20	6	58	147	25	648
Hornsby Shire	306	28	no data	0	8	11	27	42	45	467
Willoughby	184	41	24	5	5	10	39	11		363
NSROC	991	168	323	30	49	47	236	445	118	2,407

Figure 14: Number of complaints due to noise within the NSROC region 2006/07

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 DECC, 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.

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

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

ENERGY CONSUMPTION

Energy use is an integral part of human settlement. We consume energy in our houses, workplaces, streets, and any other areas 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

CASE STUDY

Lane Cove Council – Greener Safer Fleet

Over the past three years Lane Cove Council has made a strong commitment to the provision of a 'Greener, Safer Fleet' by selecting vehicles on the basis of both their environmental and safety ratings. This has resulted in a significant shift away from larger six and eight cylinder vehicles to more economical models such as the Toyota Prius (hybrid), VW Golf, and the Subaru Impreza.

This change has resulted in annual fuel savings of more than 10,600 litres which not only represents significant economic savings for Council but importantly saves around 27.98 tonnes of greenhouse gas emissions (CO_2 equivalent) each year.

To further help reduce greenhouse gas emissions Council will be installing bio-diesel tanks and fitting conversion kits for all appropriate vehicles. This will allow the use of the more environmentally friendly 85 per cent ethanol fuel blend. The use of ethanol blend fuels helps develop a viable ethanol industry in Australia and helps reduce our dependence on imported fuel.

This financial year Council will offset emissions via tree planting which not only eliminate greenhouse gas emissions but help to restore degraded landscapes in rural Australia.

Lane Council uses tree planting to offset emissions

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.

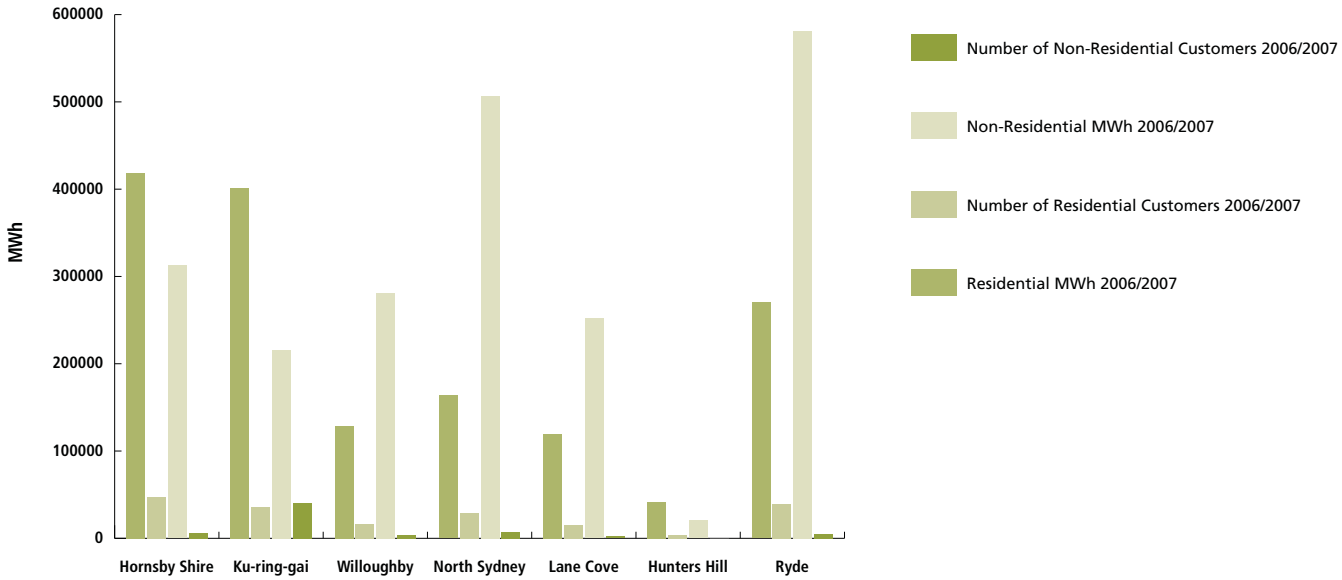


Figure 15: Energy consumption of Energy Australia customers within the NSROC region 2006/07

** This data is incomplete and is an underestimate of the yearly total. It is provided in the absence of complete data from the Energy Supplier.*

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.

Larger Councils are required to develop Energy Savings Plans 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.

Ku-ring-gai Council has recognised that there are many opportunities to reduce residential energy consumption. One program has been the Fridge Buyback program, where residents can have any second working fridge removed and recycled, reducing energy consumption at their home and reducing CO2 emissions. The program has removed 289 working fridges from Ku-ring-gai homes reducing total greenhouse emissions by 2,613 CO2 tonnes and saving residents a total of $380,035 in energy costs.

North Sydney Council is concentrating on demand management to reduce emissions. This strategy is complemented by both the purchasing of green power and a campaign to encourage our residents to take up green power as well.

The City Of Ryde's Greenhouse Gas Reduction Action Plan details a suite of actions aimed at reducing greenhouse gas emissions within both the Council and community sectors. The Plan identifies a 30 per cent reduction goal for corporate emissions and 20 per cent reduction goal for community emissions. The Energy Savings Action Plan will assist in Council achieving this ambitious goal. The Ryde community are also actively involved in reducing greenhouse gas emissions. In September 2006, Council also took part in the Fridge Buyback program, a grant funded program developed by Next Energy to retrieve and recycle residents 'second fridges'. Since it was introduced, Ryde has achieved a reduction of greenhouse gas emissions in excess of 1,835 tonnes.

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 54 million kilolitres of water during 2006/7 (a drop of approx 2 million kilolitres compared to 2005/6) with the average house using approx 237 kilolitres per year (a drop of 14 kilolitres per year compared to 2005/6).

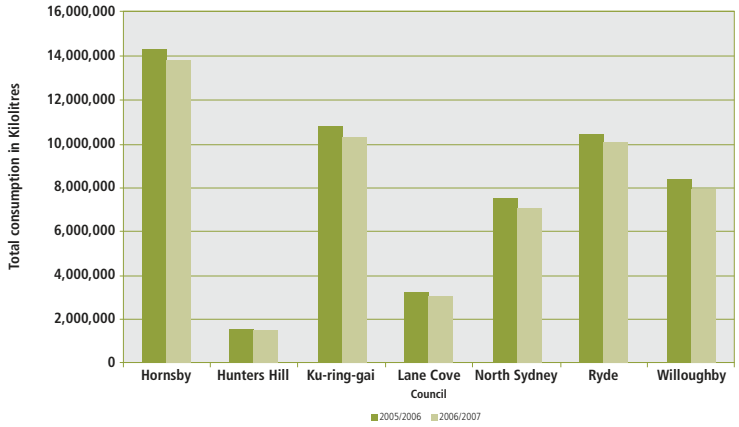


Figure 16: Total water consumption by LGA in NSROC Region, 2005/06 - 2006/07

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

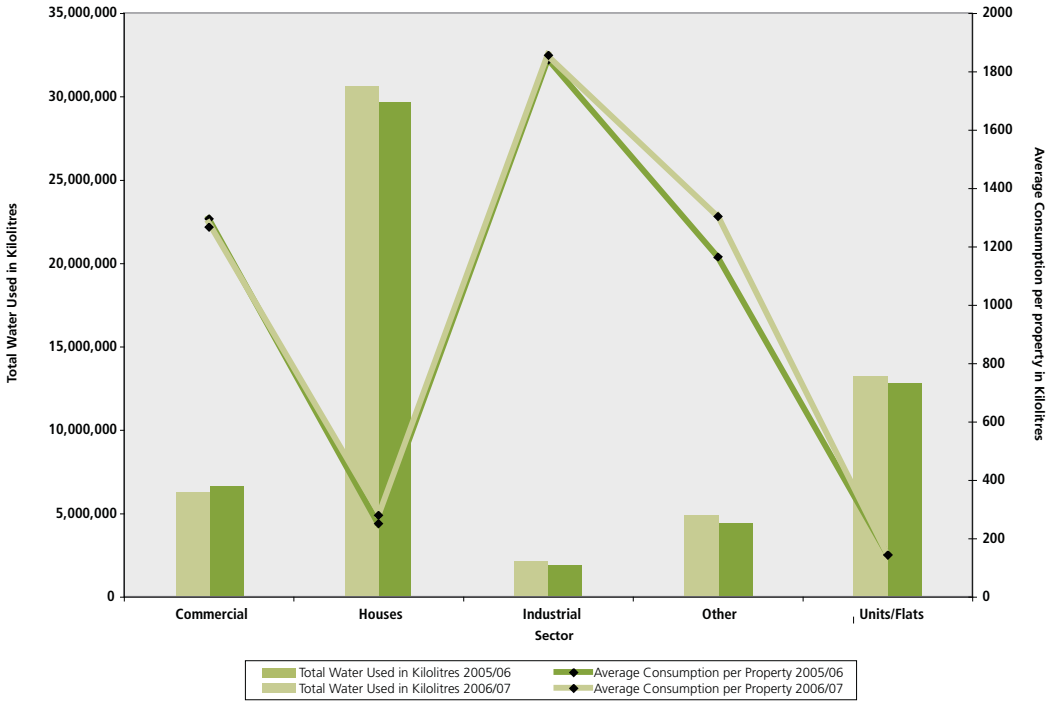


Figure 17: Water Consumption across the NSROC region by building type, 2005/06 - 2006/07

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

Meeting the Water Challenge

Safe and reliable water services are essential to support a growing population in Sydney and associated economic activities. The rising demand for water is a significant environmental issue as it puts catchments under considerable pressure. While approximately 90 per cent of the water taken from the NSW environment is used for irrigated agriculture, urban water has profound impacts on the waterways that supply the water as well as those that receive subsequent discharges of treated sewage and urban runoff.

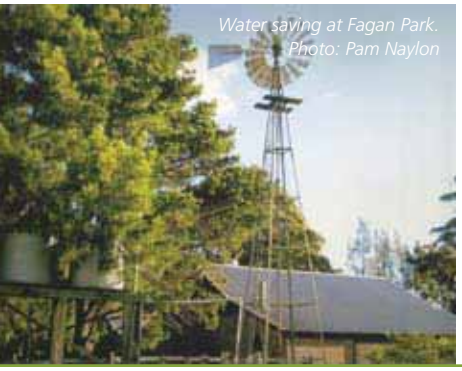
The State Government released the Metropolitan Water Plan in 2006 which aimed at securing Sydney's water supply by maximising water recycling, encouraging water savings, accessing deep water in dams, reducing leaks and commissioning a large scale desalination plant on the shores of southern Sydney. NSROC has taken the position that the desalination plant is undesirable as it will have major environmental impacts including local impacts and the environmental impacts from the significant energy demand it will create.

All the NSROC 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,

Hornsby Shire Council – ICLEI Milestone 5 Water Campaign

Hornsby became the first council in Australia to achieve Milestone 5 Corporate and Community in May 2007, and has received international recognition for its water saving initiatives.

Hornsby Council joined the International Council for Local Environmental Initiatives (ICLEI) Water Campaign in 2002. The Water Campaign is run on a milestones framework consisting of 5 Milestones. Council has already demonstrated its commitment to water consumption reduction and water quality improvement by successfully completing Milestones 1 to 5 of the Water Campaign™. This sets out to improve the water quality and reduce water consumption of council areas through various means such as education, installation of rainwater tanks, and stormwater reuse.



Water saving at Fagan Park. Photo: Pam Naylon

Since joining the Water Campaign, Hornsby Council has subsequently implemented a Water Conservation Policy and a Water Management Action Plan in 2004, as well as a Total Water Cycle Management Strategy in 2005. Council's existing Catchment Remediation Program and associated environmental projects have largely contributed to its success in being the first council to achieve Milestone 4 for Corporate and Community.

Hornsby then went on to become the first council in Australia to achieve Milestone 5 Corporate and Community in May 2007. The success of the Water Campaign builds on existing Council programs such as the Water Sensitive Urban Design Development Control Plan, the Catchment Remediation Rate program, and the Stormwater Catchment Management Strategy. This is in addition to the continued improvement and maintenance of stormwater quality improvement devices, water savings and water reuse projects for council assets, environmental education programs for schools and provision of assistance to 10 local schools to install rainwater tanks. Council has reduced its water consumption for its own operations by 21 per cent and has achieved a 20 per cent water consumption reduction through its initiatives for the community.

Council is pleased to be working in partnership with ICLEI on sustainability issues such as the ICLEI Water Campaign™ and has benefited through ICLEI's experience and international publications in the fields of sustainability.

CASE STUDY

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.

In 2006/07 Hunters Hill Council received several grants to assist with the implementation of last years Water Saving Action Plan. In addition to simple measures such as installing water saving devices, Council has embarked on several projects aimed at further reducing water consumption in Council buildings. The installation of rainwater tanks and large-scale stormwater treatment and reuse will ensure the achievement of strategic management goals outlined in the Environmental Management Plan.

Ku-ring-gai Council has undertaken many projects to reduce water consumption. Council's corporate water consumption across all facilities has decreased by over 1,300 litres in the 2006/2007 financial year based on the previous financial year's consumption. Further to this reduction, Council is in the process of undertaking an Energy and Water Performance Contract which is predicted to further reduce Council's water consumption by 2,800 kilolitres. Aside from the Energy and Water Performance Contract, Council has been investigating sewer mining and stormwater harvesting at the Gordon Golf Course. Council has called for Expressions of Interest and has undertaken an extensive tender process to select a contractor to implement the project. Council has selected a preferred tenderer and expects to begin construction in the next financial year. This project is expected to reduce water consumption at the golf course by over 90 per cent.

Lane Cove Council installed water tanks within to the Civic Centre as part of Council's participation in Sydney Water's Every Drops Counts program and Council's wider commitment to operating sustainably. The tanks form one part of a comprehensive plan to reduce consumption and dependence on mains water use. The water tanks allow the storage of water harvested from the Council's Civic Centre roof rather than letting it go down the Stormwater drain. Initially the water tanks will be used to revitalise the Council's gardens, but ultimately it is hoped to have all amenities on the Ground floor of the Civic Centre using the tank water.

North Sydney Council and the Master Plumbers Association of NSW ran a very successful free community rainwater tank seminar in the Hutley Hall, North Sydney. More than 135 community members braved the weather in June for the opportunity to find out more about the installation of rainwater tanks. The Master Plumbers Association showed residents that rainwater tanks are no longer just large, round and ugly. They come in a variety of shapes, sizes and colours to complement the urban home. Experts from the Association also provided an overview of tank types and sizes and explained the legal requirements, rebates and plumbing connections. Overall the seminar was a great opportunity for everyone to ask questions and take a closer look at a variety of different tanks and accessories that were on display.

The City Of Ryde has a number of initiatives that aim to reduce water consumption both within the Council and the wider community including the installation of a number of rainwater tanks throughout its reserves. The City of Ryde is actively reducing water consumption within the top 11 water consuming sites by fixing leaks, installing AAA rated appliances including showerheads and low flow tap fittings, waterless urinals and dual flush toilets in public amenities in parks and reserves. The City of Ryde is also investigating stormwater reuse options for parks and reserves and has achieved three Stars on the Sydney Water Every Drop Counts Business Program, which incorporates water management into the day to day business operations of Council, and assists Council to integrate water sustainability at a strategic level. The City of Ryde actively encourages the installation of rainwater tanks by residents; rainwater tanks up to 10,000 litres are classified as exempt development and therefore do not require Council approval and do not attract a Council fee. During 2006/07 Council reduced its total water consumption by 14,831 kilolitres representing a 15 per cent reduction on 2005/06 consumption levels.

Willoughby City Council has undertaken a number of initiatives to reduce potable water consumption. At the Willoughby Leisure Centre, a recirculation line and chiller has been added to the ozone treatment system saving 3,700 kilolitres per year. A 75 per cent water saving has been achieved in the Administration Building by installing flow controls on taps and toilet cisterns. Plus rain gauges and remote controls have been installed on irrigation systems for the sports fields.

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).

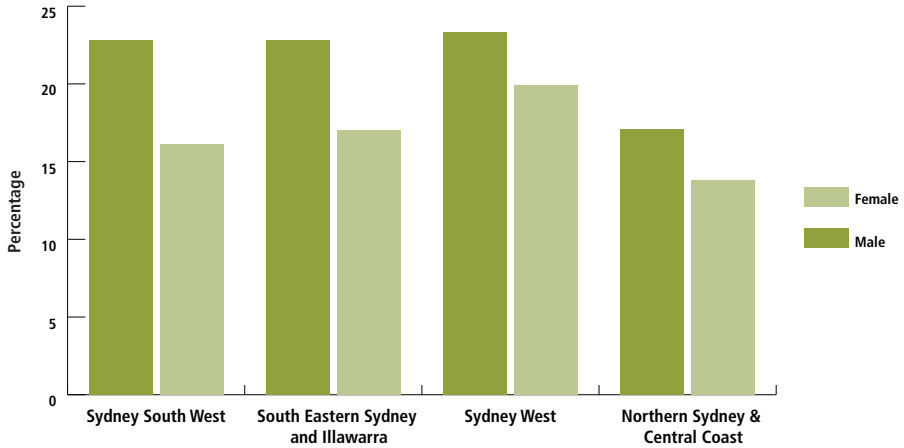


Figure 18: Daily and occasional smoking by health area and sex, persons aged 16 and over, 2005

Source: NSW Population Health Survey (HOIST)

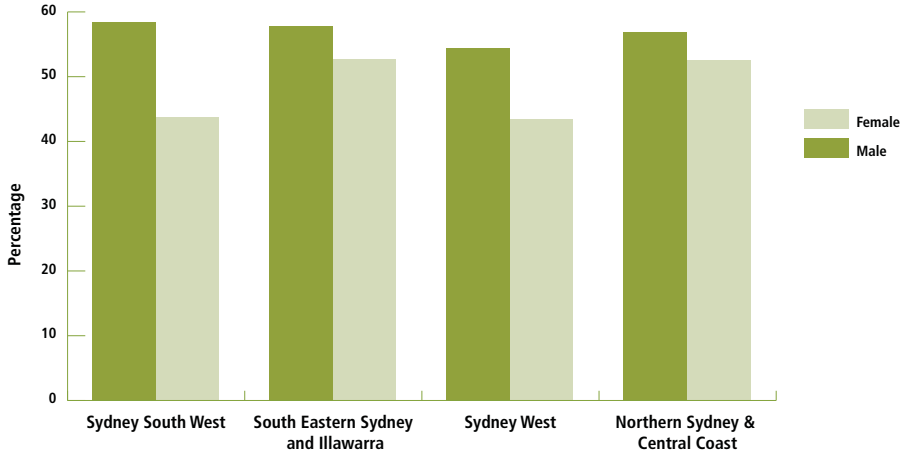


Figure 19: High blood pressure by health area and sex, 2005

Source: NSW Population Health Survey (HOIST)

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.

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

Figure 20: Prevalence of Asthma in the community, Northern Sydney Central Coast Community Health Survey 2006 (ages 18 and over)

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

** These results are based on raw score and have not been weighted to the population, generally the study over sampled those over 55 and undersampled those under 30. NSW State data consists of weighted scores from the 2005 Report on Adult Health from the NSW Population Health Survey (ages 16 and over).*

Helping Our Communities Stay Healthy

Councils in the NSROC region work closely with the community to provide services, information, education and areas for relaxation to encourage and maintain a healthy and active population. The councils in NSROC often take

a coordination, support and referral role in the provision of services to the young, elderly, disabled and mentally ill. For instance to support senior men, a new Willoughby Community Men's Shed has opened in the renovated and refurbished Northbridge RSL Hall. The Men's Shed has been developed by Willoughby City Council in partnership with UnitingCare Ageing Northern Region and the support of a $39,621 grant from the Department of Veterans Affairs used to purchase the equipment, tools and dust extraction system.

The Men's Shed will provide a much needed community space for older gentlemen and assist in their well being, health and enable contact with like-minded individuals. The Willoughby Community Men's Shed will provide a space for men to go to share a fantastic variety of activities, pursue their interests in pastimes and hobbies, learn new skills or keep old skills honed and productive and even participate in projects of benefit to the community. It is a fully equipped workshop where skilled and unskilled men can share time with each other, swap yarns and work together on both personal and community projects. The Shed provides both woodworking and metalworking workshop facilities, tools and equipment as well as free use of tools and basic material; providing opportunities for regular hands-on activities for individuals and groups.

To help seniors in the community Lane Cove Council has undertaken a new program H.E.A.R.T (which stands for 'Healthy Eating and Recreational Time'). The H.E.A.R.T program offers seniors the opportunity to take part in a series of cooking classes focussing on different cuisines such as Italian and Chinese and simple meal ideas to try at home. To celebrate what the participants learn in the classroom they later share a lunch together in a local café of the same cuisine.

The program was developed in conjunction with a Home Economist and the aim is to encourage local networks among the seniors groups at the same time as providing education about healthy eating.

Another healthy eating program was undertaken by North Sydney Council – a children's obesity program Putting Healthy Options On The Menu At Ripples – a café located at North Sydney Olympic Pool. Two taster sessions were held in November 2006 with pool users and a new healthy food menu introduced. To support the campaign a family health promotion event was held in collaboration with Stanton Library in December 2006 and a Healthy Kids brochure was produced and distributed.

Drive, the campaign against spiked drinks was another awareness raising campaign under-taken about the dangers of drink spiking. Promotional materials were printed and distributed, including 2,000 posters, 1,000 stickers and 10,000 coasters. A training event held for pubs and clubs was held October 2006.

Hunters Hill Council has been striving to meet the goals outlined within Council's Social and Cultural Plans. Supporting activities for seniors including walking groups, ferry cruises, gentle exercises and table tennis have all benefited elderly residents. Youth activities have included a number of extremely successful skate days. Children's services have been supported through Library school holiday activities and story-times. In addition playgrounds in the local area have been refurbished.

To encourage exercise in the community Ku-ring-gai Council launched the Active Ku-ring-gai program in 2006 to provide activities that enable and encourage people of all fitness levels to participate in physical activity. The program has continued into 2007 with six activities on offer:

- Pilates in the Park held at Wahroonga Park
- Gym without Walls – an outdoor group exercise class held at Bicentennial Park, West Pymble
- Tuesday Night Tennis competition in East Killara
- Tai Chi is held at Echo Point Park, Roseville.

Since its inception and due to its popularity, a further two activities have been added to the program:

- Yoga – held at the Council Chambers
- Thursday Night Tennis competition also held at East Killara.

For the City of Ryde, one of the highlights of 2006 was the half-day health and wellbeing forum for female students in Years 8 and 9, targeting bullying, nutrition and body image, time management, safety and healthy lifestyle. The highly successful forum engaged 200 students, from Ryde Secondary College, Marsden High School, Marist Sisters Woolwich and Hunters Hills High School through guest speakers, expert panellists, performances and an information expo.

The forum was a joint initiative of the City of Ryde and the Ryde CDAT (Community Drug Action Team), as part of National Youth Week and aimed to provide information and resources to young women about health and wellbeing, motivate students to make educated lifestyle choices and to respond to the emerging health and lifestyle issues facing young people today. An initial review of the feedback from students indicates that participants considered the forum to be very worthwhile and was extremely interesting, engaging and motivating.

Another major youth initiative on the calendar was the North Sydney, Lane Cove and Willoughby Council event Shoreshocked. Held since 1992, Shoreshocked, the Lower North Shore's only free, large scale youth event has grown from hosting a few rock bands and attracting a couple of thousand people to attracting more than 8,000 young people and including more than 30 bands and DJs.

This year the festival organisers wanted to ensure the event was staged in a 'sustainable manner' and conveyed positive environmental messages. As a result Shoreshocked was 100 per cent Green Powered for the very first time – using electricity sourced from renewable sources such as wind and solar.

This year also saw the debut of the 'Green Power Big Screen'. All the main stage action was captured live on the 10 metre wide Big Screen, adding another level of excitement to the event. The screen also featured environmental messages and segments especially produced for the event as well as various stories on important youth issues such as drugs and alcohol.

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

Figure 21: Adequate physical activity by health, area and sex, persons aged 16 and above, 2005.

Source: NSW Population Health Survey (HOIST)

Lane Cove Council – Community Men's Shed

Retirement poses an interesting dichotomy for many. It can be a time for discovering or renewing talents or interests, traveling and enjoying the company of family and friends. But it can also involve significant adjustments in lifestyle and in many instances this can lead to isolation and loneliness.

It's a well known trend that in retirement, women seem to be able to adjust more quickly and can establish or retain their interests and social networks. Men on the other hand, seem to find such adjustments more difficult.

Thankfully, for many hundreds of men throughout the country, the Men's Shed concept is gaining significant momentum and in doing so, helps address some key health issues.

The 'Community Men's Shed' is a meeting place for senior men to get together, make friends and to renew or discover 'shed' type hobbies, such as woodwork and metalwork. These sheds offer fully equipped and supervised workshops with tools and materials for the men to tackle interesting and diverse projects. The Shed gives the members a sense of camaraderie which typically hasn't been experienced since they left the workplace. For many, this interaction is an important aspect of their overall health and well being.

At the recent 'Community Men's Shed' conference, a Research Paper on an Australian-wide study on Men's Sheds in Australian community contexts was presented by Professor Barry Golding, School of Education, University of Ballarat. He discussed how the Men's Shed concept is making an impact with senior men's health.

"Basically, Men's Sheds work. They are a great idea, a terrific resource for any community. Getting together on a regular basis helps keep the men feeling positive about their lives. It also allows them to keep an informal tab on each other and provide support through the tough times such as illness and grief."

The Men's Shed concept is also proving to be a very important facility for men in rural areas where serious problems such as depression and suicide are unfortunately on the increase. "At a Men's Shed the members can for a short time, get away from the stress and strain they are shouldering on the home front. When a community is struggling, a Men's Shed serves as a truly valuable resource," commented Professor Golding.

Lane Cove Council was involved in establishment of the Lane Cove Men's Shed in 1997. Today it is managed by UnitingCare Ageing Northern Sydney Region. Councillor Ian Longbottom, Mayor of Lane Cove commented: "We are urging everyone involved in Community Men's Sheds to talk to their local members, both State and Federal and their local council about the importance of this resource. These places effectively support older men so they can have an active role within their family and their community and also provide vital health benefits. It would be great to see every community have one."

CASE STUDY

3

Bushland and Biodiversity

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.

Lambertia formosa flower

City of Ryde – New Flora and Fauna Studies

The City of Ryde is undertaking systematic biodiversity surveys during the Autumn and Spring months for a number of years, to identify and list indigenous and exotic flora and fauna that exist in community bushlands of Ryde, in particular to identify threatened species and communities. The new species list from selected local reserves will contribute to a database, to which future survey data can also be added for comparison of biodiversity data and condition of bushland.

The information derived from permanent recording sites, so called quadrats, will also be used to re-evaluate vegetation community classification according to new numerical methods developed by the NSW Department of Primary Industries (NSW DPI). On completion of the vegetation community survey in the City of Ryde, Council will consider amending the existing bushland map for the City, as NSW DPI is currently incorporating the new quadrat and vegetation data into their latest update of vegetation maps for the Sydney region.

For example, through accurate studies of flora within the survey quadrats in some prominent bushland parks, it has been established that there is no Blue Gum High Forest, as previously deduced through qualitative methods, and this community has instead been classified as Turpentine Ironbark Forest, which is also an endangered vegetation community.

The fauna studies cover a vast range of organisms: invertebrates (insects, spiders, molluscs) and vertebrates (mammals, birds, reptiles, amphibians). The largest bushland reserve in the City is the Field of Mars Reserve, and it holds the highest fauna diversity so far in the City. Some of the fauna found there last year were native fish, unusual micro-bat species, Echidna, Sugar Gliders and threatened Powerful Owls, which is a promising result. On the other hand, the City has a poor record of frogs, large reptiles and small birds, and there are pest rats, mice, foxes, cats, and pest birds competing with or consuming native animals

Most importantly, the surveys will assist the City to identify reserves with areas that require establishment to conserve or improve local and regional biodiversity, and this is particularly in regard to threatened species and ecological communities. The study data and the consultants' recommendations from 2006 have already been incorporated into Plans of Management for individual Parks.

CASE STUDY

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.

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 DECC.

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 a valuable link between Sydney Harbour and Lane Cove National Park. Considering the extent and intensity of urban development in the region as well as the proximity to the Sydney CBD, these bushland areas are significant not only on a local, but also on a regional scale.

Adjoining bushland on public space along the Lane Cove River Foreshores is privately owned land and has a 50 metre Foreshore Protection Zone. This area is covered by a site specific Development Control Plan whereby no building is allowed within 50 metres from the foreshore and remnant vegetation has to be retained.

In North Sydney Council there remains nearly 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. Despite this relatively small area of bushland, the variety of habitat types and their proximity to larger bushland areas in neighbouring Council areas result in a surprisingly diverse array of native flora and fauna species. North Sydney Council is committed to the ongoing conservation and recovery of these bushland areas for the benefit of the community and bushland's own intrinsic value.

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

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

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

Ku-ring-gai has 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.

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	95	92	95
Hunters Hill	40	30	99
Ryde	559	209	38
Ku-ring-gai	3,148	1,161	16
Hornsby Shire	34,540	5,750	4
Willoughby	338	290	85
NSROC	38,770	7582	62

Figure 22: The size and proportion of bushland in the NSROC Region by LGA, 2006/07

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.

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

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

CASE STUDY

North Sydney Council – Adopt a Plot

Community Bushcare project 'Adopt a Plot: Help Preserve our Bush Reserve' encouraged residents of Cremorne Point to take an active role in a bushland plot within Cremorne Reserve. This was either by committing to work with a qualified bush regenerator for three hours a month or by making a donation for the work to be done by a qualified bush regenerator.

The Envirofund grant project was made possible by the initiative and dedication of the Cremorne Point Bushcare group with support from Bushcare and funding from the Australian Government Envirofund.

The success of the project was demonstrated by the higher than anticipated participation rates, a large proportion of the reserve 'adopted' and bush regeneration activity carried out on previously untouched and weed infested slopes. The resident White-browed Scrubwren was continually monitored throughout the project period and provided an indicator for the rate and pattern of clearing of lantana, the scrubwren's key habitat in this Reserve.

Since the project began, the forty or so residents of Cremorne Point who participated in the Adopt a Plot project operating in Cremorne Reserve have continued the support of their plots and new participants have joined in. This sustaining outcome of the initial grant project has ensued that the plot areas in the reserve have become less weed infested and more florally diverse over time.

There has been an overwhelming majority of residents at Cremorne Point who have signed up to do the work rather than pay for it to be done. This is the best result for the bushland as through doing the work that is involved, residents are facilitated to increase their awareness of our local plants and the animals they support. The project is also branching out to people who welcome the knowledge of what weeds are taking over the bushland and how to keep them away.

The stewardship of the reserve that has resulted from the resident participation has made a noticeable improvement, with less dumping of garden waste, more care with dog droppings and less complaints to Council regarding the state of the reserve. With so many new residents now involved in the process of bush regeneration and the knowledge of degrading factors that cause the most concern, the long-term stewardship, biodiversity protection and improvement of the reserve is looking positive.

Bushland Management continues to be an integral part of Councils service to the community in Lane Cove. Joint projects between the two smallest NSROC Councils Hunters Hill and Lane Cove Council are proving to be successful with the partnership between the two Councils continuing to strengthen with joint Bushcare activities and bushland management projects.

In Ku-ring-gai Council a detailed study is being carried out with Macquarie University to determine the effects of urbanisation on the ecology within bushland reserves, in particular riparian corridors, using ant species as an indicator of terrestrial macroinvertebrate diversity. This study is being conducted to help inform the planning process, in particular the decisions made in regard to Ku-ring-gai's riparian policy. Preliminary investigation of the data confirm that larger riparian corridors contain greater species diversity and results appear to show that the urban environment potentially influences bushland habitat for up to 20 metres from the interface. Further data analysis is required, including comparison of the ant data with vegetation surveys, and hopefully the results will help to refine the setting of appropriate corridor widths to provide the best protection for bushland habitats.

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 3615 hectares of council managed open space. This amounts to about 69 square metres per person.

Ku-ring-gai Council – Bushland Encroachment Policy

The Ku-ring-gai Local Government Area contains over 92 kilometres of interface between Council-owned, community bushland and private property. In some locations, unauthorised extensions or 'encroachments' onto bushland have significantly impacted on the natural environment, public access and Council's field operations.

Encroachments at the urban-bushland interface typically consist of small-scale, formal works, including landscaped gardens, storage sheds, shade/entertainment structures, turfed lawn and paving. Unauthorised encroachments on Council-managed bushland reserves have the ability to:

- Compromise the integrity of natural and cultural values;
- Alienate land from public use/access;
- Impede fire management activities;
- Detract from aesthetic appearances;
- Divert and encumber council resources and assets;
- Jeopardise public safety;
- Cause social inequity; and
- Incite possibilities of liability issues.

In response, Ku-ring-gai Council adopted a Bushland Encroachment Policy in March 2007 to provide a strategic, cost-effective and consistent enforcement framework to address encroachments on Council-managed bushland.

While the draft Policy generally assumes a prohibition approach, the management of encroachments on Council-owned bushland is achieved through a combination of case-dependant mechanisms, including proactive education, voluntary agreements and regulatory action for non-compliance under the Local Government Act 1993.

In its initial three months, over 33 properties/residents were engaged or investigated; 20 encroachments were removed, five voluntary agreements were signed and one official order served under the framework of the Bushland Encroachment Policy.

Encroachments can make a negative impact on bushland aesthetically and environmentally.

CASE STUDY

Council	Volume of open space under council management in hectares	Volume of open space per capita (square metres)
North Sydney	145	25
Lane Cove	151	50
Hunters Hill	67	50
Ryde	367	36
Ku-ring-gai	1,161	114
Hornsby Shire	1,285	170
Willoughby	439	67
NSROC	3,615	69

Figure 23: The total area of open space and area of space per capita for councils within the NSROC region, 2006/07

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 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 Climate Change, 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

CASE STUDY

Hunters Hill Council – The Great North Walk Track Upgrade

Hunters Hill Council successfully gained grant funding from the Sharing Sydney Harbour Access Program to upgrade tracks along The Great North Walk in Hunters Hill. The main sections of track work were in Kellys Bush and Boronia Park. Works involved track resurfacing, hand rails on steep sections, drainage works, additional steps and boardwalk sections. One section of boardwalk will allow public access above Coastal Saltmarsh, an Endangered Ecological Community defined in the Threatened Species Conservation Act 1995, in order to allow the expansion of that plant community over a larger tidal area. Signage will increase community awareness of the importance of the estuarine ecology and Aboriginal heritage in Boronia Park.

In Kellys Bush, areas of exposed slag remaining from the local tin smelter in the late 1800s are being capped. Signage promotes public awareness of the significance Kellys Bush as the site of the first Green Ban.

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	5	0.2
Lane Cove	0	0
Hunters Hill	2	1.5
Ryde	1	7.4
Ku-ring-gai	6	17
Hornsby Shire	5	51
Willoughby	10	5.8
NSROC	29	82.9

Figure 24: Fire management by Council within each LGA in the NSROC region, 2006/07

Hazard Reduction in the NSROC Region

Fire management is undertaken in cooperation with the DECC, 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 manage hazard reduction in the region. Hunters Hill, Lane Cove, City of Ryde and Willoughby Bushfire Management Committee works with the NSW Fire Brigade to produce a Bushfire Fuel Management Program. The program forecasts planned hazard reduction and ecological burns. Information contained in the Plan includes:

- Maps showing location, zoning and area of burn
- Risk assessment
- Asset protection
- Site description and vegetation classification
- Fire history
- Fuel layers.

CASE STUDY

Ku-ring-gai Council – Blackbutt Reserve

Ku-ring-gai Council has always placed great value on its Threatened Ecological Communities, none more so than the Blue Gum High Forests. Ecological burning of these communities has been undertaken at regular intervals throughout the years and has met with varying degrees of success. The biggest problem has been the amount of post fire weed maintenance that can be sustained over a long enough period of time so that invasive weeds can eventually be all but eradicated from the site. A big ask in that it can take up to ten years post fire to eventually reach a point where a site can be maintained with a once a year visitation. However, it is not impossible as the case of Blackbutt Reserve at Pymble demonstrates.

Blackbutt Reserve is a small remnant Blue Gum High Forest in Pymble NSW and was burnt in December of 2000. A third of the reserve (0.29 hectares) was identified for burning and preparation began. Pre fire weeding took place prior to the burn and the debris created was left in-situ to add fuel to the fire. As with many such remnants the canopy was native but the understorey was primarily weed. It took many weeks over a period of several months to properly prepare the site and proved a large commitment of personnel and other resources. Eventually though, the site was prepared and a suitable day was sought in which to carry out the burn.

The chosen day for the burn proved ideal and the burn went off without a hitch. The burn intensity for the most part, proved to be moderate with occasional flare ups where fuel loads were higher.

The easy part had now been completed and the more difficult post fire period began. The site responded well to the fire

with a profusion of native regrowth It was worked relatively intensively by Council Bush Regeneration Team for the first year post fire and tapered off as natives began to dominate and crowed the weeds. Natives now dominate the understorey where weeds once prevailed.

However, regenerating a site properly requires a long term commitment. The success story at Blackbutt Reserve can be attributed to much, much more than just the addition of Council resources. The site has a Bushcare Group associated with and it is this group which has made the long term commitment necessary to its rehabilitation. So pleased are the group with the results that another third of the site is now undergoing preparation for ecological burning possibly December 2007 if conditions prove good.

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

In Hornsby unseasonal weather patterns have severely hampered the 2006/07 Hornsby Shire Council prescription burning program resulting in a major decrease in on-ground activities. As a result Council increased its fuel break development program manually reducing fuels in over 11 hectares of bushland at the interface of Council bushland and private assets. There was a major increase in interface manual fuel reduction over the year. Over the year, 570 permits to burn were issued to assist residents in preparing their homes by cleaning up fallen vegetation. Thirty hazard reduction certificates were also issued under the environmental assessment code for private residents to undertake prescription burning or clearing activities in preparing their homes.

Unfortunately, the 2006/07 winter period did not provide the most suitable weather conditions for implementing North Sydney Council's hazard reduction and ecological burn program too, resulting in a lower than anticipated number of burns undertaken. Despite this constraint, those burns that were carried out have produced impressive levels of regeneration, with previously unrecorded species germinating in the burnt areas.

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 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 are a major problem in bushland of the NSROC region. For example, in Hornsby there are 42 species on the noxious weed list including lantana, pampas grass, castor oil plant and blackberry along with aquatic plants 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.

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.

CASE STUDY

Kur-ring-gai council – Cliff oval weed control and trial work

In March 2006 funding became available to control weeds on Council land within Kur-ring-gai through the Department of Land and Water Conservation (DLWC). One area that needed particular attention was Cliff Oval. In response, regeneration work commenced on the site in May 2006.

Cliff Oval site is a strip of disturbed Sydney Sandstone bushland adjoining Kur-ring-gai Chase National Park on the north and eastern side and a sporting oval on the western side. Dominant species here include a *Eucalyptus haemastoma* and *Eucalyptus gummifera* with *Banksias serrata, Leptospermum*, *Hakea* and *Grevillea* understorey and a diverse shrub layer, including Bossiaea sclopendria and Lambertia formosa. The ground cover consists, predominantly, of *Imperata cylindrica, Geranium homeanum, Dichondra repens* and *Microlaena stipoides* with a number of sedges and rushes occupying wetter areas, including *Ghania, Cyperus* and *Isolepis*.

For a number of reasons, natural bushland in the area has been significantly impacted. Excess seepage from the oval has created a prominent weed plume entering further into bushland. During the construction of the recreational oval, imported landfill was used which has created a suitability for weed proliferation in some areas. Further impact has arisen due to pathways being made by visitors to the oval. The southern edge of the site is bordered by residences, where some bush regeneration and fire reduction work has taken place in recent past.

To combat the problem, council engaged a contractor to remediate the site. Three distinct areas and methods were used:

Geranium homeanum regenerating in soil inoculated area

1. Imported soil embankments with dense weeds: Weeds were removed with cutting and by painting herbicide. A nearby track construction within the Kur-ring-gai Chase National Park provided an ideal opportunity for rehabilitation of the area where primary works were undertaken. Soil from the track construction site was transported to the Cliff Oval site and was then spread over the area.

2. Kikuyu dominated embankments: Shrubs and canopy species were planted to establish shade to limit the weed invasion.

3. Natural canopy with scattered weeds: Hand weeding was used producing positive results.

Council will seek further funding 2007-08 from DLWC for weed control on this reserve.

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.

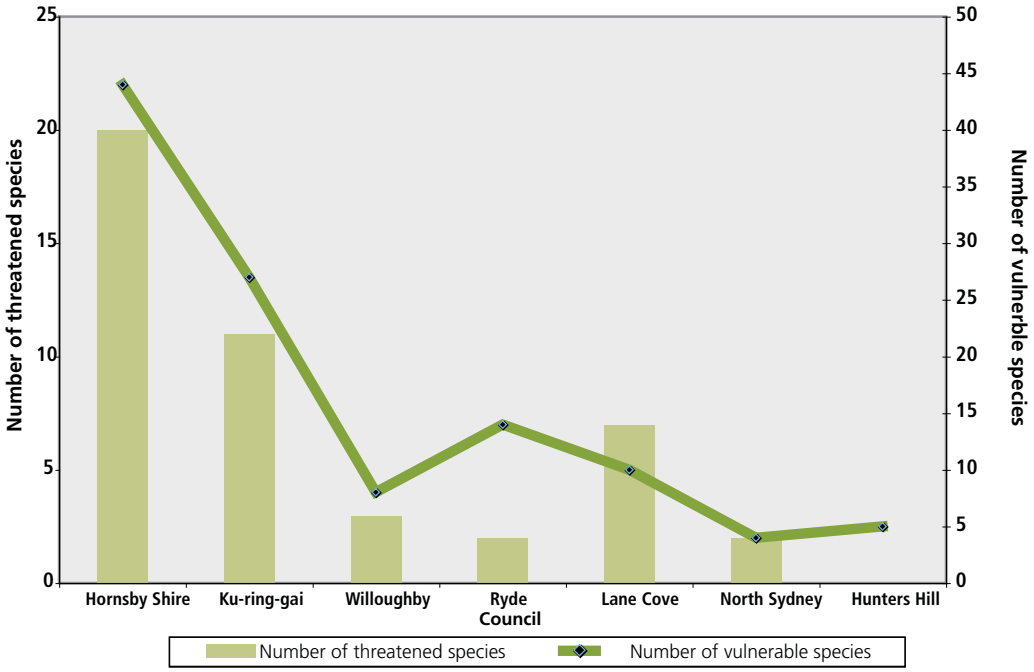


Figure 25: Number of Threatened and Vulnerable Species in the NSROC Region *(Noonan 2005)*

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.

NSROC Education and Training

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 Wet Are Plants, Urban Bushland Fire Ecology, Composting and Worm Farms, Grass Identification, The Ecology of Eucalypts and a hands-on experience with Australian Wildlife called Something Wild! Families and Kids across the Northern Sydney Region were provided with the opportunity to meet Blossom the Ringtail Possum, and Terry the Tawny Frogmouth Owl as well as species of frogs, lizards, snakes and other bushland residents.

Evening talks and activities included the open space screening of '*An Inconvenient Truth*' in Naremburn Park and the presentation of the Climate Change Project by Willoughby Council. Water and Energy Saving in the Home and Greening Your Home were hosted by North Sydney Council and the Hunters Hill Trust. The sessions were advertised in resident newsletters, libraries and Council officers.

Bushland Management Sections within Councils also delivered Bushcare training courses for their Bushcare volunteers. Courses were run for beginners and experienced participants. Training topics included bush regeneration aims and strategies, threatening processes, weed and native plant identification, weed removal techniques, herbicide usage and native fauna habitat requirements.

CASE STUDY

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. Lane Cove Council's Community Plant Nursery continues to grow providing the parks, gardens and bushland of Lane Cove with good healthy locally grown plant stock. The use of plants grown from remnant seed help protect core bushland areas, strengthening habitat and vegetation corridors and maintains good biodiversity. Community Plan Nurseries play an integral role in the effort to increase conservation awareness of local areas. In addition they provide another avenue for the local community to get involved in their local environment.

NSROC councils are involved in a range of other 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;

- 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 protect local biodiversity Hornsby Shire Council adopted the updated 'Biodiversity Conservation Strategy' and 'Biodiversity Conservation Action Plan' in August 2006 which provides an overview and sets priorities for biodiversity conservation actions in the Shire. Under the strategy a number of actions were completed:

- A Native Vegetation Communities of Hornsby Shire report and map were prepared and updated to provide a baseline of vegetation information on significant vegetation such as Endangered Ecological Communities and Critically Endangered Ecological Communities.
- A Bushland Condition and Priority Ranking for Bushland Restoration study of Hornsby Shire was prepared.
- Endangered vegetation was restored at six schools and Vegetation Plans prepared.
- A Roadside Endangered Vegetation Restoration grant project with Works Division to enhance roadside corridor vegetation.

Other partnership programs undertaken by Hornsby Shire Council include; the Rural Lands Incentives Program, Gardens for Wildlife, Hornsby Bushcare and Community Nursery.

In Ku-ring-gai Council, the management of its biodiversity has revolved around the regeneration of 24 bushland areas, the majority containing threatened or critically threatened ecological communities. Actions have included community environmental partnership programs such as Bushcare, which has over 1,000 registered volunteers and Landcare which was awarded a $438,000 grant to develop the program further with two neighbouring councils. Landscaping controls were also imposed on private land as part of development approvals. Through the Environmental Levy, encroachments into bushland are being systematically addressed as well as the expansion of pre and post fire weeding to complement the fire management program.

Within Ku-ring-gai, the management of threatened species and ecological communities is also a continual concern. Its efforts were recognised by the Department of Environment and Climate Change in using Browns Forest and Dalrymple Hay Nature Reserve as the first demonstration sites to showcase the management of threatened species and ecological communities. Throughout the year its bushland reserve system expanded through the transfer of land to Council by the NSW Department of Planning at Wombin Reserve Roseville and the Bat Colony Gordon.

Council	Volunteer numbers	Volunteer hours	Value of hours (in dollars @ $25 per hour)
North Sydney	220	3,000	75,000
Lane Cove	229	3,600	90,000
Hunters Hill	80	1,895	47,375
Ryde	100	2,833	70,825
Ku-ring-gai	1010	12,900	322,500
Hornsby Shire	887	3,220	80,500
Willoughby	320	6,250	156,250
NSROC	2,846	33,698	842,450

Figure 26: The contribution of Bushcare volunteers in the NSROC region, 2006

4

Water

Photo by Simon Punch

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 27: 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	Berry Creek	3.00
	Quarry Creek	3.25
Hunters Hill	Brickmakers Creek	3.47
	Tarban Creek	2.65
	Tarban Tributary	2.89
Ryde	Buffalo Creek	3.18
	Porters Creek	3.23
	Terry's Creek(end of Summerset Rd)	3.28
	Shrimptons Creek	3.22
	Archers Creek	2.94
Lane Cove	Gore Creek	3.6
	Stringybark Creek	2.57
Willoughby	Swaines Creek	3.33
	Flat Rock Creek	2.50
	Sailors Bay Creek	3.08
	Scotts Creek	3.55
	Sugarloaf Creek	2.57
	Blue Gum Creek	2.80
Hornsby Shire	Hornsby Creek	2.8
	Smugglers Creek	4.2
	Colah Creek	5.2
	Terry's Creek	2.7
Ku-ring-gai	Avondale Creek	2.00*
	Blackbutt Creek	3.56*
	Coups Creek	3.10*
	Little Blackbutt Creek	2.50*

Figure 28: Water quality results at sites within the NSROC region using Macroinvertebrate Analysis, 2006/07

**2005/2006 data used. Due to the consistent results each year, Ku-ring-gai Council has reduced the frequency of aquatic macroinvertebrate assessments.*

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

CASE STUDY

The City of Ryde – Water Quality Monitoring

The City of Ryde is continuing the implementation of a biological and chemical water quality monitoring program targeting five main creek systems within its local Government area over seven years. The City is also part of a separate macro-biological monitoring program being conducted in the Middle Harbour and Lane Cove River Catchments involving the NSROC councils Willoughby, North Sydney, Lane Cove, Hunters Hill, Ku-ring-gai and Ryde Councils.

The program is guided by the City's Community Water Quality Monitoring Steering Committee. Recently Water Quality Monitoring (WQM) results have been used by the committee to investigate specific actions to improve creek health. The committee has begun to focus on identifying appropriate actions for catchment management in line with the monitoring results. These actions include educational programs which complement bush regeneration efforts and catchment restoration as well as constructing maps of the catchment areas to map historical works.

Educational programs in line with Council's WQM strategy include catchment tours. City of Ryde provided a tour of the Archers Creek Catchment for the Chinese Women's Group. The tour began at Maze Park where Council officers took water samples of Archers Creek and tested for dissolved oxygen, temperature and pH. After this demonstration, the group moved on to investigate a stormwater Gross Pollutant Trap (GPT) which had been opened up for viewing. The group were able to see just how much pollution is saved from entering Ryde waterways by Gross Pollutant Traps installed by Council. Following this, the group collected and identified a sample of macroinvertebrates which help to provide an indication of creek health. On the way back to the bus the group were shown a fish ladder which Council installed to assist fish to swim around and up stormwater systems. Council offers these tours to the community free of charge and is also currently investing in a new stormwater Gross Pollutant Trap for Terry's Creek, stormwater education programs and continues in its efforts to replace weed infested areas with native vegetation.

Lofberg Quarry Creek with high sediment load

Kur-ring-gai Council – Lofberg Quarry Creek Sustainable Water Management

Ku-ring-gai Council has undertaken extensive studies into stream health and options for sustainable water management within developed catchments. Results from a modelling and design project completed on the management of stormwater runoff in the Lofberg Quarry Catchment, Pymble show that there are substantial benefits for both catchment health and community sustainability from the implementation of water sensitive urban design (WSUD) and water reuse plans.

Bicentennial Park, situated in the centre of the Lofberg Quarry Catchment, has a number of sporting and recreational facilities that will potentially benefit from more efficient use of the stormwater resource, and is therefore the focus of the water sustainability objectives.

A number of approaches have been investigated as part of an integrated approach to water management within Lofberg Quarry Creek catchment.

These approaches include:

- Catchment wide implementation of water tanks, for a variety of uses from garden use only to combined garden, toilet flushing and hot water;
- Implementing rain gardens and formalising road swales to improve the quality stormwater runoff and reduce the hydraulic connectivity between built surfaces and the receiving waterway (Quarry Creek);
- Providing two separate stormwater bioretention and reuse projects within Bicentennial Park, including the Lofberg Oval stormwater bioretention and irrigation project and Norman-Griffiths Oval stormwater bioretention and pool re-use for irrigation.

Plans are to be implemented over the next five years and will provide one of the first examples of a catchment wide approach to retrofitting a developed urban area with WSUD features from Sydney.

CASE STUDY

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 is 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	95	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	95	Woolwich Baths	Lower Lane Cove River
Summer	100	100	Greenwich Baths	Lower Parramatta River
Winter	100	100	Greenwich Baths	Lower Parramatta River
Summer	90	94	Northbridge Baths	Middle Harbour
Winter	95	95	Northbridge Baths	Middle Harbour
Summer	97	94	Hayes Street Beach	Port Jackson
Winter	95	95	Hayes Street Beach	Port Jackson

Figure 29: Compliance by per cent of pollution at NSROC Beaches, 2006/07 *(Beachwatch 2007)*

Note: Winter season is May 2006 to September 2006, Summer season is October 2006 to April 2007
% Compliance is percentage compliance with Beachwatch swimming water quality guidelines.

Improving Catchment Management

In 2006 the NSROC councils agreed to form the NSROC Waterways Group to provide a more holistic 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 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.

CASE STUDY

North Sydney Council – Stormwater Re-use Project

North Sydney's largest parks and sporting facilities will soon be irrigated using recycled water due to the development of an innovative scheme to harvest stormwater from a 94-hectare catchment area. It will be used to irrigate the Council's major parks and sporting facilities, including St Leonards Park and the historic North Sydney Oval.

This scheme is expected to save 90 million litres of drinking water each year. On the current cost of water Council should break even over 20 years, however, if the drought continues, the cost of water will no doubt escalate and the project will start saving money well before that.

The first stage of the work was to install a Gross Pollutant Trap (GPT) as a primary water treatment measure on the source box culvert in Cammeray Golf Course. It was completed in early 2006 using funds from the Council and grants from the RTA and the then NSW Department of Energy, Utilities and Sustainability (DEUS).

Unfortunately, work then stalled as grant applications to the State and Federal Governments were unsuccessful. However, in early 2007 a grant from DEUS (now the Department of Water and Energy) of $1.2 million and the NSW Environmental Trust of $240,000 has meant the scheme can go ahead.

Storage tanks in St Leonards Park under construction

Stage 2 of the scheme is the St Leonards Park Stormwater Reuse Project. This project is well under way and is due for completion in late October 2007. It includes:

- One kilometre long rising main to allow pumping of stormwater from the GPT;
- Sensors in the GPT to prevent pumping stormwater unsuitable for recycling;
- Various grades of self-flushing sand filters to reduce turbidity;
- 280 kilolitres of modular underground storage tanks in St Leonards Park;
- UV treatment to kill bacteria;
- Chemical dosing system to facilitate fertilising/further treatment of recycled water;
- Irrigation pipes and sprinklers with about 13,000 metres square coverage in St Leonards Park;
- Automated control of the entire system; and
- Provision of recycled water to the existing irrigation systems in North Sydney and Bon Andrews Ovals, and capacity to supply North Sydney Bowling Club in the future.

Stage 3 is the Cammeray Park Stormwater Reuse Project to supply recycled stormwater to the golf course and Cammeray Oval soccer and croquet fields. This project is due for completion in early 2008 and will involve the construction of a three Megalitre earth dam and new irrigation network for the 9-hole Golf Course.

Stage 4 of the project in 2009 will involve extending the irrigation from the dam to Primrose Park, while local GPTs are being planned as the water source for irrigating Tunks and Forsyth Parks, both significant parks in the North Sydney local Government area.

Besides the ICLEI Water Campaign, Ku-ring-gai Council undertakes a variety of catchment management programs throughout the local Government area. A new inclusion to its existing projects has included the installation of a series of trial rain gardens as a method of improving the quality of stormwater flowing into the catchments. The project was designed to reduce the impact of water borne pollutants such as sediments, metals and hydrocarbons that are generated by stormwater flow over streets that adversely impact on receiving waters and waterway health. Stormwater is diverted into the planter box and filtered through a sandy loam prior to discharge to the stormwater system. The bioretention systems operate as a series of individual cells linked by a high flow pathway so runoff from local catchments can be evenly distributed into each cell. The size of the catchment is the defining indicator as to the size of the system that is installed. The success of this trail will determine if this method of catchment management will be further integrated into Council's existing suite of programs.

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 region 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 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)*

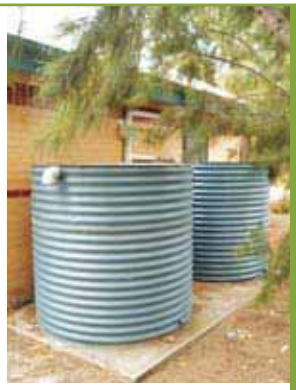
The Department of Environment and Climate Change (DECC) reported that catchment areas have been greatly modified, with creek systems being extensively channelised or hard-edged with concrete. Wetlands have been destroyed or degraded and, natural remnants of vegetation are often impacted by weeds and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

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

Willoughby City Council – Offsetting OSD

Willoughby City Council has a discounting scheme for on-site detention (OSD) systems. The scheme gives applicants the option to obtain a reduction in the requisite OSD storage capacity. The discounts vary in size up to 100 per cent depending on the size of rainwater tank installed and the intended water used. On an average residential site in Willoughby, to be eligible for a 100 per cent discount on the OSD storage capacity the tank must be a minimum of 10,000 litres and be connected to both the toilet and washing machine.

The impetus for the scheme was to assist in reducing the potable water demand in local residential sites and to reduce the total volume of stormwater runoff from Willoughby's highly urbanised areas which is entering local bushland and waterways, and significantly contributing to the degradation of the natural environment. Rainwater tanks of 10,000 litres or greater have the potential to reduce the total runoff by up to 30 per cent per annum from each site. The 10,000 litre rainwater tanks are also generally of sufficient size to retain most of the roof runoff during the frequent minor storm events, which can be more damaging to the natural waterways than the less frequent major storm events.



There has been a 90 per cent uptake of the 100 per cent discount option in residential developments during the 2006/2007 business period. The public prefer the installation of a 10,000 litre rainwater tank in lieu of an on-site detention device as they perceive a benefit to themselves and the cost of installation is generally lower than an OSD device. The 10 per cent who did not install a 10,000 litre tank generally experienced site limitations. Larger developments have been installing small storage tanks with limited uses due to the prohibitive cost of dual reticulation systems or lack of opportunity for use of the stored water.

CASE STUDY

Those projects and strategies include:

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

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.

Hunters Hill Council conducted a stormwater education program in early 2007 to inform residents of their responsibility to assist with managing the quality of stormwater entering natural environments. In addition to general education, Council partnered with schools to develop slogans for drain stencils to be sprayed on stormwater drains in the municipality. Council also received grant funding in partnership with members of the Parramatta River Catchment Group to implement projects aimed at improving the quality of water entering the Parramatta River. The grant will be used to capture, treat and reuse harvested stormwater from the Car Park at Clarkes Point sailing club. The project is due to begin in 2008.

In addition to pollution treatment and prevention initiatives, Hornsby Council's Catchment Remediation Rate funds ongoing works associated with the maintenance and monitoring of these assets and the receiving waterways. In 2006/2007 the cleaning of the existing stormwater improvement assets yielded 1,400 tonnes (or 260 truck loads) of sediment, litter and excessive organic matter which was therefore prevented from entering the Shire's waterways.

North Sydney Council seeks to improve the quality of water entering our creeks and waterways through a variety of methods including a recent Cigarette Butt Blitz where plain clothes rangers targeted smokers educating them on responsible behavior and issuing fines. Other educational initiatives have included drain stenciling and gross pollutant trap excursions where school students observed the litter traps being cleaned and Council staff encouraged them to take actions to improve the amount of litter in their school grounds.

With respect to the environment and assets, particularly water quality, flood mitigation and capital works, the City of Ryde's role is to administer and oversee the strategic direction of the City's catchments and waterways in order to improve the overall efficiency and quality of Council's stormwater system. This includes the management of local creeks, stormwater drainage networks and water quality and quantity. In addition, the Council provides a consistent corporate approach to Asset Management for the City to identify opportunities to improve our current systems and plans. Next year a complete review of the City's Stormwater Asset Management Plan is planned including incorporating assets into the City's GIS.

Catchment activities that have been undertaken or started this year include several park upgrades and related water sensitive urban design/harvesting/reuse at Peel, Tuckwell, Waterloo, Meadowbank and Monash Parks; micro-tunnel design at Buffalo Creek near Higginbotham Road; other catchment management improvements in the Ann Thorn catchment; and improved drainage works through Bill Mitchell Reserve, Santa Rosa Park, Adventure Park and Jennifer Park.

Council	Gross Pollutant Traps (GPTs) per area	Tonnage waste removed from GPTs	Cost of GPT construction ($)	Cost of GPT maintenance ($)
North Sydney	25	312	nil	70,000
Lane Cove	4	6.6	n/a	12,000
Hunters Hill	43	5.5	0	27,500
Ryde	26	116	0	45,254
Ku-ring-gai	131	25	0	13,200
Hornsby Shire	349	1,400	775,000	309,000
Willoughby	6	61	0	19,710
NSROC region 2006/07	**584**	**1,926.1**	**775,000**	**496,664**
NSROC region 2005/06	**522**	**1,330**	**1,068,500**	**510,353**

Figure 30: Performance and expenditure relating to Gross Pollutant Traps within the NSROC region, 2006/07

5 Atmosphere

Photo by 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.

GLOBAL WARMING

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 ratified 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)*

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

Greenhouse Gas Issues

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.

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

The fundamental challenge for local Government is therefore to help their communities reduce their energy dependency while at the same time identify activities which will offset emissions are ameliorate the negative impacts of climate change.

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	3706	1571	33281
Lane Cove	953	n/a	n/a
Hunters Hill	230	n/a	n/a
Ryde	5569	549	8380
Ku-ring-gai	1847	469	272
Hornsby Shire	1,917	2,858	47,345
Willoughby	3,741	1385	9730
Total for NSROC region	17,963	6,832	99,008

Figure 31: Greenhouse emissions and reduction through council action in the region, 2006/07

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

Figure 32: NSROC Climate Change Initiatives endorsed by NSROC Board on 10 May 2007

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

Figure 33: NSROC carbon emission reduction targets

CASE STUDY

Willoughby City Council – *An Inconvenient Truth*

Willoughby City Council took the opportunity to promote climate change issues and encourage people to act in February 2007 with an outdoor screening of *An Inconvenient Truth*. Held at Naremburn Oval in conjunction with the Department of Energy, Utilities and Sustainability and the Naremburn Progress Association, the screening marked the advent of a number of events including the release of The Stern Report indicating that cost of inaction on climate change was greater than the cost of action; the release of the Al Gore documentary *An Inconvenient Truth*; and the physical impacts of climate change that were being felt by Sydneysiders through the ongoing drought popularised the climate change issue.

The night was extremely successful with over 2,000 people attending. A large inflatable screen, pre-film entertainment, and information and food stalls provided a relaxed neighbourhood feel to the event.

To follow up from the screening of *An Inconvenient Truth*, a Climate Project workshop was held in the Dougherty Community Centre with over 100 people came to listen to an Al Gore-trained presenter. The following month, the Climate Change Despair and Empowerment Roadshow came to Chatswood.

All events were with accredited GreenPower. This was part of a larger promotion to get more people signed up to GreenPower as the single easiest way to reduce household greenhouse gas emissions. A letter from the Mayor, Clr Pat Reilly, was sent to all ratepayers encouraging them to act on climate change and sign up to accredited GreenPower. Willoughby also held the Switch and Ditch competition providing information on what accredited GreenPower is and how to the make switch to GreenPower.

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. A number of the NSROC councils are also investigating a Local Government Emissions Trading Scheme (LGETS) in the absence of any firm federal commitment to commence such a scheme.

Most significantly all of the NSROC councils have adopted carbon emission targets for both their own activities and those of their communities. Many of these targets have evolved out of participation in the CCP Programme and are matched by a variety of council actions to ensure that progress is made towards achieving the targets in the desired timeframe. A core problem for council is how to measure emission accurately and also how to achieve significant reductions once the first wave of efficiency measures have been implemented. Nonetheless carbon emission reduction remains one of the most important objectives of all the NSROC councils.

The individual NSROC councils have shown considerable commitment to responding to climate change and the reduction of greenhouse gas emissions. Ku-ring-gai Council has continued to work towards reducing its corporate greenhouse emissions in response to mitigating climate change. As part of implementing council's Energy and Water Savings Action Plan, Council has investigated Energy Performance Contracting as a method of reducing emissions. During the reporting period Council engaged a consultant to develop a Detailed Facility Study (DFS) of Council's cities to form the basis of a future energy performance contract. The resulting DFS lists projects which will produce a corporate greenhouse emission reduction of 440 tonnes CO2 per annum. Within the next reporting period Council intends to implement the projects listed in the DFS to assist in mitigating climate change in addition to investigating ways to adapt to climate change.

Lane Cove Council in March 2007 achieved Milestone 2 in the five-milestone Cities for Climate Protection program. This milestone was achieved by Council setting Greenhouse Gas Reduction Targets. Lane Cove Council has set a target of a 50 per cent reduction in their corporate greenhouse gas emissions, and a 50 per cent reduction in their community greenhouse gas emissions (based on 2000/01 levels), a goal which Council aims to achieve by 2017. The next step is to produce a local action plan, including a range of measures, which will set out how Council will achieve the emission reduction goals by 2017.

CASE STUDY

Hornsby Shire Council – Sustainable Energy Strategy

With 2010 in mind, Hornsby Shire Council has developed a Sustainable Energy Strategy. This outlines Council's intent on continuing its local greenhouse reduction actions in order to manage the anticipated increase in energy demand resulting from both the growth of the Shire's population and Council assets.

As part of the Strategy, Council has committed to revising its greenhouse reduction targets for 2012 (a 35 per cent reduction) and 2050 (a 60 per cent reduction) to ensure there is a significant effect in reducing the impacts on the sustainability of the Shire. As of June 2007, Council has reduced its own greenhouse gas emissions by 27.8 per cent of 1995/96 levels.

The success of Hornsby Shire Council's sustainable energy management program in reducing greenhouse gas emissions throughout Council to date has led to an extension of efficiencies into new capital projects and a whole of organisation embracing of new initiatives. All improvements achieved help the organisation to progress towards Council's strategic intent of 'creating a living environment'. With the above in mind, it was determined that Council required a single guiding document for the implementation of energy initiatives. This resulted in the development of the Sustainable Energy Strategy 2006-2010.

Data management is vital to Council effectively managing greenhouse emissions as it allows monitoring of progress toward reduction goals and identifies areas that Council needs to focus on. Council receives monitoring and verification reports from its EPC contractor who analyses energy and water savings at the 150 sites covered by the EPC. Energy and water use is analysed using regression analysis tools, normalising for variables such as weather, so that an accurate account of project savings are generated. Council has also engaged an external agent to collect data from all utility bills and compile quarterly reports and benchmark information. In order to streamline this and obtain better data, Council is investigating installing sub-meters at large energy sites to allow downloading of energy, water, and gas data at any time. Within two years, Council anticipates developing more collaborative relationships with energy and water suppliers with the intent of facilitating improved data management.

Hunters Hill Council also progressed through Milestone 2 of the program setting targets for future greenhouse gas reduction. A 50 per cent reduction in corporate greenhouse gas emissions by 2020 will set Council on the pathway to minimising its impact on the climate. The establishment of this vision as part of a more sustainable future for Hunters Hill will be a driving force for implementing innovative energy reduction projects now and in the future. Council is currently developing Its Greenhouse Gas Reduction Action Plan that will map out a risk-based approach to implementing successful projects.

North Sydney Council has implemented a range of strategies to tackle climate change including the 3CBDs Greenhouse Initiative, which encourages businesses to rate their building using ABGR and improve on greenhouse performance advice. Council has hosted a range of energy forums and workshops and currently offers free energy audits for householders and providing residents with energy efficient light globes and AAA showerheads.

The City Of Ryde has shown its commitment by developing a range of policies to reduce greenhouse gas emissions. The Greenhouse Gas Reduction Action Plan in conjunction with the Energy Savings Action Plan and the City's Local Air Quality Management Plan 2004-2009, outline a range of actions to reduce greenhouse emissions from both the Council and community sectors. In addition, the City Of Ryde has established an internal multi-disciplinary team of staff known as the City Of Ryde Water and Energy Strategy Team (CORWEST) Team to implement these and other environment and sustainability initiatives. For 2006/2007, measures implemented have resulted in a saving of over 8,929 tonnes of CO2. The City Of Ryde is well on its way towards achieving its impressive reduction goal of 30 per cent total greenhouse gas emissions based on 2003/2004 levels by 2012/2013.

Willoughby City Council has installed solar hot water combined with a heat pump system to warm pool water at Willoughby Leisure Centre. To further enhance the greenhouse gas emission savings from this site, Willoughby has been negotiating the procurement of a co-generation system. This will use natural gas to generate electricity and the thermal energy from this process will be used to heat the pool water.

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)*

Overall, air quality in Sydney has been steadily improving since the 1980s. Significant contributors to anthropogenic emissions in Sydney include motor vehicles, major industry, household and commercial solvent use, household and commercial fuel combustion; commercial activities such as automotive repair shops; and domestic activities such as lawn mowing and solid fuel heaters. The NSW Government's Metropolitan Strategy (2005) references the national air quality standards and sets out a series of environmental targets. One target is to reduce air emissions and improve compliance with national standards for air quality to protect health. However it should be noted that how this is to be monitored and achieved is not made apparent in the document or subsequent subregional strategies. Action for Air is the NSW Government's 25 year air quality management plan for Sydney and includes major measures for addressing air quality. A review of Action for Air is anticipated to be completed in 2007.

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

Figure 34: 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 Service (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. In 1998, ambient air quality standards and goals for six pollutants were set in the National Environment Protection Measure for Ambient Air Quality. Concentrations of carbon monoxide, lead and nitrogen dioxide in Sydney are below their national standards and sulphur dioxide is well below its national standard. However, photochemical oxidants, ozone and particle pollution do exceed air quality standards at times. Emissions are mainly from motor vehicles and while new cars produce fewer emissions, increased ownership of cars offsets any improvements. (DECC, 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.

An additional major concern is in relation to the dearth of systematic regional air quality data. There is only one permanent State funded regional air quality monitoring station in the NSROC region 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 DECC 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.

Willoughby City Council – Air Quality Monitoring

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

The AQMS has been fully operational since January 2006 and equipment is recording ambient air quality data for Nitrogen Oxides (NOx), Carbon Monoxide (CO), PM10 (particulate matter less than 10 microns in diameter) and PM2.5 (particulate matter less than 2.5 microns in diameter). Whilst there are large number of pollutants, which have historically shown to impact on air quality in Sydney's airshed, these four pollutants are considered to present the greatest risk to the health and well being of residents within the local Government area. Motor vehicles are the greatest contributors to these pollutants, however industrial processes, wood fire heaters, bushfires and other combustion sources also contribute.

The data that has been collected show an exceedence in both PM10 and PM2.5 during the month of November 2006. These reported exceedences in particulate concentrations were a widespread occurrence in the Sydney region and a direct result of pollution being blown into the Sydney basin from the bushfires within the Blue Mountains area.

Pollutant	Averaging period	Maximum concentration	Goal within 10 years Maximum allowable exceedences
Carbon monoxide	8 hours	9.0 ppm	1 day a year
Nitrogen dioxide	1 hour 1 year	0.12 ppm 0.03 ppm	1 day a year none
Particles as PM10	1 day	50 µg/m3	5 days a year

Figure 35: National Environment Protection Measure for Ambient Air Quality Guidelines

CASE STUDY

Responding to Air Quality Issues

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

Councils have a limited ability to respond to air quality issues in an immediate manner. This is due to limited data on the extent and nature of the pollution events, difficulty in identifying the exact sources of air pollution, and the fact that licensing and regulation of polluting industries is a State rather than a local responsibility. Councils endeavour to 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 managing greenhouse gas emissions.

6

Soil Landscape


Photo by Warwick Hall

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. ***(DECC, 2000)***

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

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.

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. Soil erosion leads to a loss of topsoil, organic matter and nutrients. It also degrades soil structure and decreases water storage capacity, thus reducing fertility and the availability of water to plant roots. Soil erosion is therefore a major threat to biodiversity. Soil erosion can degrade floodplains, riverine and coastal water quality and aquatic ecosystems by significantly increasing sediment and nutrient loads. The costs to the community of restoration works and the decline of productivity from soil erosion are hard to quantify. The Sydney Catchment Authority has mapped all gullies in its area of operations and is systematically remediating and treating them based on their potential to deliver sediment. The impacts of climate change, such as intensive storms and frequent bushfires, are likely to accelerate erosion. *(New South Wales State of Environment Report 2006, Department of Environment and Climate Change, December 2006, p 114.)*

Causes of Erosion

The common causes of soil erosion in 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

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.

For instance, Hunters Hill Council's regulatory and environmental officers have continued to actively enforce sediment control on construction sites. Where Council is not the Principal Certifying Authority, the officers ensure that both the certifier and the builder are informed of any sediment control issues. By doing so, the non-compliance can be continually monitored by all parties. Penalty infringement notices have been issued for non-compliance with development consent conditions relating to sediment control, as well as notices under the *Environmental Planning and Assessment Act 1979.*

Hornsby Shire Council has had a Sedimentation Control Program in place for a number of years to control water pollution from development building sites. Statistics for the 2006-07 financial year included:

- 653 new building sites required erection of sediment controls prior to commencement of excavation works;
- Approximately 720 sites were inspected during this period. 615 were found to have erected and maintained fences to Council's requirements. Follow up inspections on 151 sites were carried out.
- 75 breaches were identified that were rectified through consultation.
- 57 penalty notices, and directions to upgrade barriers were issued during this period.

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 DECC and Department of Planning The Contaminated Land Management Act 1997 empowers the DECC 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 DECC 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 DECC-listed activities and if so, whether it may be contaminated. Council records factual information about possible contamination or actual contamination on property Planning Certificates.

Contaminated Sites in the Region

The number of contaminated land sites in the NSROC region during the 2006/07 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 36: Number of declared contaminated land sites in the NSROC region, 2006/07

Responding to Land Contamination

The remediation of contaminated sites is a slow, complicated and expensive process that can take many years to complete. The prevention of contamination through pollution control is therefore important. Continued State and local Government cooperation is needed to ensure contaminated sites are adequately identified, appropriately regulated with respect to the risk of the contamination, and satisfactorily remediated to ensure the land is suitable for the proposed land uses. Due to the introduction of stronger environmental legislation and the licensing of industrial activities, it is unlikely that the number of new contaminated sites being created will increase dramatically. However the prevention of new contamination requires continued vigilance by the operators and regulators of activities that may cause contamination of land. State Environmental Planning Policy Number 55: Remediation of Land plays a key role in preventing contaminated land from being used for a more sensitive land use without appropriate investigation and, if required, remediation. *(New South Wales State of Environment Report 2006, Department of Environment and Climate Change, December 2006, p 132.)*

All Councils continue to monitor development activity in relation to contaminated sites on an on-going basis. Councils work closely with the DECC 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

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