NORTHERN SYDNEY REGIONAL ORGANISATION OF COUNCILS

STATE OF THE ENVIRONMENT REPORT 2008/2009

Northern Sydney Regional Organisation of Councils
nsroc

NORTHERN SYDNEY REGIONAL ORGANISATION OF COUNCILS

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

Northern Sydney Regional Organisation of Councils
nsroc

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Hunter's HILL
Mayor Hoopmann

Councillor Delegate
Richard Quinn

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Mayor Malicki

Councillor Delegate
Ian Cross

LANE COVE
Mayor Longbottom

Councillor Delegate
Ann Smith

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Councillor Delegate
Veronique
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RYDE
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Councillor Delegate
Ivan Petch

WILLOUGHBY
Mayor Reilly

Councillor Delegate
Terry Fogarty

PRESIDENT'S MESSAGE

Welcome to our fifth NSROC Regional State of the Environment Report covering the 2008/2009 financial year. This past year has seen a continued focus on the environment in terms of climate change management, however communities have also had a new challenge of a global financial crisis added to the mix. This combination of environmental and economic uncertainty has seen a heightened awareness amongst NSROC councils of the importance of sustainability of our communities.

Over the 2008/2009 year NSROC councils have continued working with their communities and led by example so that environmental sustainability remains front of mind. The economic downturn has highlighted the importance of sustainable resource management and the need to manage consumption and behaviours responsibly for the economic and environmental benefit of future generations. The economic-environment nexus is expected to be more sharply defined in the next 12 months as a carbon emission trading scheme is developed at a federal government level.

The goal for our community is shared by the nation: Australia needs to move away from its high dependence on fossil fuels and other non-renewable resources, and to take up sustainable and environmentally appropriate lifestyles. Our work at a local level attempts to deliver on this objective.

This Regional State of Environment report (SoE) has been produced by the seven councils (Hornsby Shire, Hunter's Hill, Ku-ring-gai, North Sydney, Lane Cove, City of Ryde, and Willoughby City) which comprise NSROC, and is likely to be the last report structured in this format. The State Government has introduced substantial changes to local government reporting processes. One outcome is that councils will report on environmental issues and actions in a more integrated way through an approach which encompasses financial, social and governance issues, as well as those relating to the natural and built environment.

The report notes some key improvements in areas such as waste management and increased community participation in local sustainable initiatives and programs. However more work remains to be done particularly in the areas of sustainable transport and in preparing their communities for the anticipated impacts of climate change and population growth. The State Government's failure in many areas of infrastructure provision is of great concern and the NSROC councils are strongly advocating for mass public transport improvements in recognition of the environmental and other benefits that these systems can provide.

Once again, I commend this Regional SoE report to you as the next step in ensuring the environment of our region receives the strategic, collective and sustainable management approach it so richly deserves.

Pat Reilly
Mayor of Willoughby Council
President of NSROC
November 2009

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
DECCW	Department of Environment, Climate Change and Water (formerly the Department of Environment and Climate Change DECC incorporating former agencies known as NSW EPA, see below)
DLG	NSW Department of Local Government, now the Division of Local Government within the NSW Premier's Department
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 Environment Plan
LTP	Local Transport Plan
LGA	Local Government Area
NPWS	National Parks and Wildlife Service
NSESD	National Strategy for Ecologically Sustainable Development.
NSW EPA	New South Wales Environment Protection Authority (now DEC)
NSROC	Northern Sydney Regional Organisation of Councils (Hunter's Hill, Hornsby Shire, Ku-ring-gai, Lane Cove, North Sydney, City of Ryde, Willoughby City)
RFS	Rural Fire Service
SHOROC	Shore Regional Organisation of Councils
SMCMA	Sydney Metropolitan Catchment Management Authority
SoE	State of the Environment Report
SMP	Stormwater Management Plan
TCM	Total Catchment Management

KEY FINDINGS

- This Regional State of the Environment Report is the 5th produced by NSROC. It is structured along the same lines as previous reports to enable comparative analysis (Introduction).
- There has been increased spend in Environmental Programs across the NSROC region. (Chapter 1).
- According to ABS estimates NSROC population numbers continues to grown although more slowly than in 2007. The population is ageing overall but youth population in some council areas is increasing. The number of one and two person households is higher in the NSROC region compared to the Sydney average (Chapter 2).
- Aboriginal and non-aboriginal heritage management continues to be a big challenge for councils with increasing development pressures (Chapter 2).
- Urban planning and transport indicators are not positive for the NSROC region. Congestion is increasing, travel times are longer, and car usage is increasing across the region. Meanwhile Councils are filling the gap in terms of community transport by providing $1million of services and developing bike and pedestrian improvements (Chapter 2).
- Waste management is trending well with overall waste to landfill declining in 2008/09 (Chapter 2).
- Noise complaints have increased - primarily related to aircraft noise. Noise relating to barking dogs is the second highest complaint category (Chapter 2).
- Residential energy consumption increased overall by 1.2 % while population increased by 0.8%. However increases were only slight in each Council area except for the City of Ryde where consumption decreased by 0.1% (Chapter 2).
- Commercial energy consumption increased by only 0.1% with two Council areas reducing their commercial energy consumption – Lane Cove by -6.4% and North Sydney by -1.4% (Chapter 2).
- The northern Sydney region consumed around 52 million kilolitres of water in 2008-09 (an increase of about 2 million kilolitres compared with 2007-08) (Chapter 2).
- Community health of the region is improving. Based on area health data which extends to Central Coast, NSROC residents appear to be healthier than the urban average with the exception of asthma and high risk drinking (Chapter 2).
- Bush care volunteers numbers have flattened compared with 2007/08 however but individual hours per volunteer have increased. Bushland diversity appears static (Chapter 3).
- Bushfire management has continued to be active however due to low rainfall and poor bush area growth, fewer controlled burns have been undertaken (Chapter 3).
- Catchment quality in the NSROC region remains a concern. Although monitoring improvements have been undertaken and investment in gross pollutant traps and stormwater harvesting has risen, water quality remains lower than desirable (Chapter 4).
- Air pollution and carbon reduction programs are being undertaken by most councils. However beyond energy consumption in council properties, estimating the specific reductions in CO2 derived from Council actions and programs remains subjective (Chapter 5).
- Various mapping programs are being undertaken by Ku-ring-Gai Council, the Sydney Coastal Councils Group and the Sydney Metropolitan Catchment Management Authority which are improving councils capacity to monitor and measure key environmental changes (Chapter 6).

Introduction

THE NSROC REGION

The Northern Sydney Regional Organisation of Councils (NSROC) covers a diverse area of more than 681 square kilometres and is home to more than 500,000 people. It includes the local government areas of North Sydney, Lane Cove, Willoughby City, Ku-ring-gai, Hornsby Shire, City of Ryde and Hunter's Hill. All are collectively represented by NSROC.

The region is home to a variety of landscapes and communities. These range from scenic waterways, bushland parks and areas of historical significance, through to residential high-rise living, and thriving commercial and retail centres. Such a large and disparate region provides many challenges to effective environmental management.

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

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

Recognising these pressures NSROC has again produced a regional State of the Environment (SoE) report so that appropriate responses and understanding can be developed at a regional, catchment and community level.

STATE OF ENVIRONMENT REPORTING

An SoE report is one of the corporate reporting responsibilities of NSW local government under the *Local Government Act 1993*. It is intended to provide the community with a report as to what condition the environment is in, why it got that way and what is being done to address the issues. Historically the legislation has required that the SoE report:

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

Under recent amendments in October 2009, future State of the Environment reports are to be integrated with a new Community Strategic Reporting framework. However this report which reflects the financial year of 2008/2009, retains the more prescriptive structure of the previous reporting requirements and should be viewed as a transitional document. The report builds upon the data reported in the previous years and each chapter has been generally constructed around the accepted standard of reporting known as the State-Pressure-Response model used by the Federal and State Governments in their respective SoE reports.

WHY A REGIONAL SOE REPORT?

The value of a regional report is that it enables the community and NSROC to have a greater understanding of the status, 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.

By working together the NSROC Councils have also looked at a consistent regional reporting framework and a set of common indicators appropriate for reporting across local government boundaries. This has proved a significant challenge but a valuable process. While all councils are required to report against key identified environmental issues according to the legislation, each has chosen its own way of interpreting these reporting requirements. They have also gathered data through different methodologies and emphasised different issues according to what is affecting their environment at a local level.

THE FUTURE

The future of local-level environmental reporting in the NSROC region is changing. The amendments to the Local Government Act introduced in October 2009 proposed a more integrated model which will no longer require a SoE report to be completed each year. Instead, it is anticipated that councils will adopt an integrated planning model which combines core elements of sustainability (economic, social, environmental and governance) into a 10-year strategic plan, a four-year management plan and yearly operational plans.

To complement this regional and long range approach, NSROC completed a Regional Sustainability Plan in 2007 to help councils move towards the new planning and reporting model over the next few years. It is intended that the Regional Sustainability Plan will correlate with and provide some overarching direction for each Council's new Community Strategic Plans. It is hoped that this new approach will see a greater connection between environment outcomes and Council actions which should achieve greater community sustainability.

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Towards Sustainability

Towards Sustainability

A healthy environment is necessary for a productive economy and a cohesive society. The concept of '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. Unsustainable practices cannot continue indefinitely without degrading current conditions and reducing future opportunities.

In addition to general environmental issues, the sustainability context for NSROC councils includes 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.

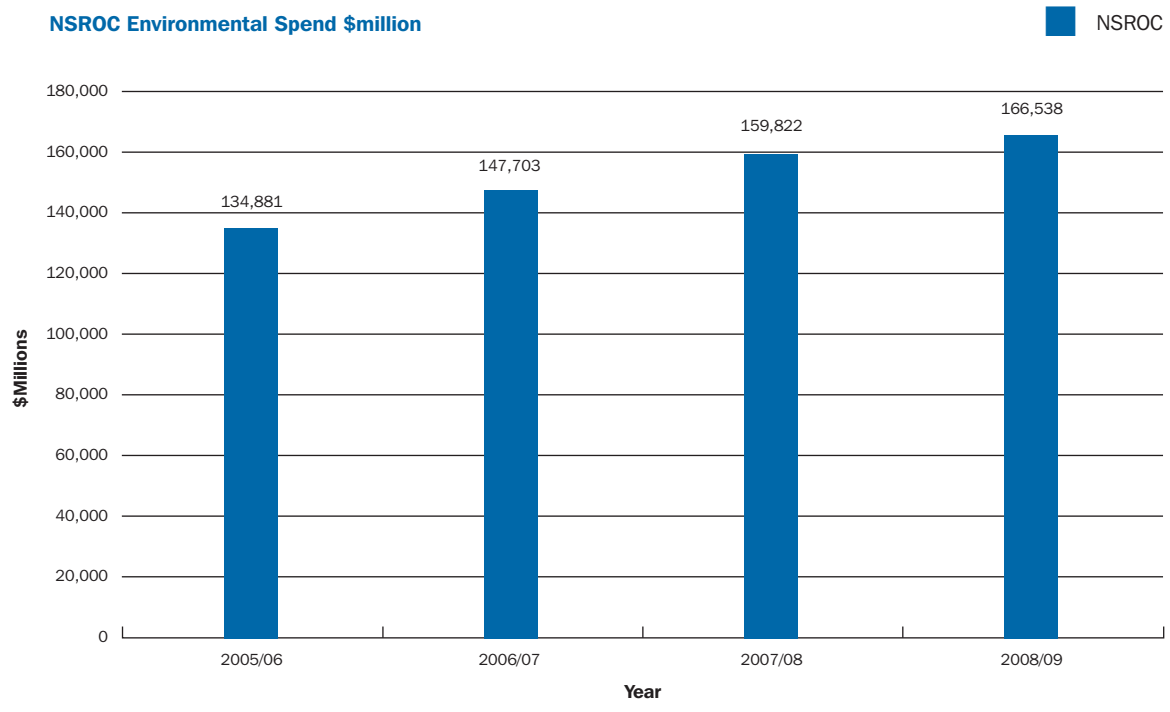
Community and individual concern for the environment and willingness to take action to reduce impacts are vital elements in achieving sustainable outcomes. This is increasingly reflected in the facilitation role councils have adopted in organising and involving residential communities and business interests in environmental programs and actions. One measure of this commitment is the levels of expenditure associated with environmental activities and initiatives by NSROC councils as shown in Figure 1.

Figure 1: Total Expenditure on Environment by council 2008/09

NSROC council	Expenditure 2008/09 ($)	Population of LGA (estimate for 2008/09)	Area of LGA (square kilometres)
Hornsby	$45,801,561	159,211	509
Hunter's Hill	$2,855,000	14,092	6
Ku-ring-gai	$20,303,854	108,135	84
Lane Cove	$8,943 596	31,638	10
North Sydney	$26,459,471	62668	10
Ryde	$42,772,732	103,597	40
Willoughby	$28,345,039	68,008	23
NSROC Total	$166,537,657	547,349	628

Councils work in an environment of constant financial pressure because of on-going rate pegging, cost shifting and an expansion in the service expectations of their communities. However heightened environmental concerns are recognised in councils operations and are reflected by the increased expenditure by NSROC Councils on environmental related activities over the last four years as shown in Figure 2.

Figure 2: Total NSROC regional environmental spend 2005/06 to 2008/09



CASE STUDY

WILLOUGHBY – Climate Clever Schools

As part of its new *ClimateClever* campaign, Willoughby City Council launched an innovative new schools program to provide practical assistance to its local schools. *ClimateClever* Schools provides access to free energy and water assessments and student activities such as excursions and lessons that integrate with the curriculum. An important aspect of the program is the provision of facilitated workshops to assist schools to develop their School Environmental Management Plan (SEMP). The SEMP is a mandatory requirement of the NSW Department of Education and Training and provides a means for the school to plan for and employ sustainable practices. Willoughby City Council hopes that by providing this program, school communities will be well positioned to capitalise on emerging opportunities such as the Australian Government's National Solar Schools Program which provides funding for solar PV. The program also aims to foster learning opportunities that increase students' understanding of sustainability. This ultimately will ensure that students are well equipped to meet the challenges of the economic transformation that will occur as we move towards a clean, green economy of the future.

SUSTAINABILITY GOALS AND MEASURES

There are a variety of sustainability goals, objectives and targets that have been developed by different levels of government and organisations. NSROC Councils endeavour to take these into account when setting regional and individual councils aims.

In 2006 the **NSW State Plan** articulated the following environmental objectives:

Figure 3: NSW State Plan 2006 – Priorities and Targets

Code	Priorities	Targets
E1	A secure and sustainable water supply	– Meet standards for service reliability and water quality. – Increase water recycling for Sydney and regional centres – Improve water use efficiency – Restore water extraction from rivers to sustainable levels
E2	A reliable electricity supply with increase use of renewable energy	– Achieve electricity reliability for NSW of 99.98% by 2016 – Achieve 15% renewable energy consumption by 2020
E3	Cleaner air and progress on greenhouse gas reduction	– Meet national air quality goals in NSW – Cut greenhouse emissions by 60% by 2050
E4	Better environmental outcomes	– Meet NSW Government Targets for protection of natural environment ie native vegetation, biodiversity, land, rivers and coastal waterways (see Figure 4)
E5	Jobs closer to home	– Increase the number of people living within 30 minutes of a city or centre by public transport
E6	Housing affordability	– Ensure a supply of land and a mix of housing that meets demand
E7	Efficiency of road network	– Maintain current travel speeds on Sydney's major road corridors despite increase in travel volumes
E8	More people using parks, sporting and recreation facilities and participating in arts and cultural activity	– Increased visits to State Government parks and reserves by 20% by 2016 – Increased participation in sporting activities by 10% by 2016 – Increased visits and participation in the arts and cultural activities by 10% by 2016

The State Plan also set out further specific targets on Natural Resource Management:

Figure 4: NSW Targets for Natural Resource Management (State Plan 2006)

Biodiversity	
1.	By 2015 there is an increase in native vegetation extent and an improvement in native vegetation condition.
2.	By 2015 there is an increase in the number of sustainable populations of a range of native fauna species
3.	By 2015 there is an increase in the recovery of threatened species, populations and ecological communities
4.	By 2015 there is a reduction in the impact of invasive species
Water	
5.	By 2015 there is an improvement in the condition of riverine ecosystems
6.	By 2015 there is an improvement in the ability of groundwater systems to support groundwater dependent eco-systems and designated beneficial uses
7.	By 2015 there is no decline in the condition of marine waters and ecosystems
8.	By 2015 there is an improvement in the condition of important wetlands, and the extent of those wetlands is maintained
9.	By 2015 there is an improvement in the condition of estuaries and coastal lake systems
Land	
10.	By 2015 there is an improvement in soil condition
11.	By 2015 there is an increase in the area of land that is managed within its capability
Community	
12.	Natural resource decisions contribute to improving or maintaining economic sustainability and social wellbeing.
13.	There is an increase in the capacity of natural resource managers to contribute to regionally relevant natural resource management.

CASE STUDY

LANE COVE COUNCIL – Shifting towards sustainability

Lane Cove Council, with consultants TKPartnership, conducted the highly successful community workshop series Shifting Towards Sustainability during 2008/09. Over 200 residents were engaged through a series of 15 workshops which encouraged a range of sustainable behaviours such as reducing energy and water consumption, eliminating waste, growing your own food, using sustainable transport and creating wildlife friendly gardens. Additional workshops for sustainability 'champions' explored topics such as communicating about sustainability, advocacy and lobbying, and the role of community action.

The key to the success of the program was that it worked with existing networks in the Lane Cove community. Ten tailored workshops were offered to community groups in Lane Cove on a topic of their interest, at a time and venue chosen by the group. This component of the workshop series was based on the principle of 'meeting people where they already meet'. These workshops successfully engaged some community groups that are not typically associated with sustainability.

Existing local environment groups and sustainability 'champions' were given the opportunity to develop their skills as presenters by delivering short presentations as part of the community workshops. These presenters provided an important local perspective during the workshops, while developing their own capacity to educate and motive their peers.

The community workshop series was part of a broader and long-term strategy to build sustainability practices in the Lane Cove community and will be followed with a similar program in 2009/10.

In the 2007/08 SOE Report, NSROC noted its **NSROC Regional Sustainability Plan** (RSP) developed in early 2008. The RSP identified a hierarchy of sustainability issues and goals as follows which parallel the State Government objectives and specify key areas of local government:

Figure 5: NSROC Regional Sustainability Plan 2009-2014 (July 2008)

Issues	Goals
1. Climate Change and Energy Consumption	**Reduce energy consumption** 1. Reduce non-renewable energy use **Reduce GHG emissions** 2. Reduce emissions by councils 3. Reduce emissions by the community **Adapt to climate change** 4. Plan to adapt to climate change
2. Development and Built Environment	**Manage development sustainably** 1. Avoid over development 2. Minimise impacts of medium / high density housing on infrastructure and the community 3. Maintain and increase open space **Increase sustainable building** 4. Adopt and champion sustainable building practices for both new buildings and retrofits **Provide adequate infrastructure** 5. Ensure adequate infrastructure overall
3. Water and Sewerage	**Save water** 1. Increase recycling by Councils and businesses 2. Increase on-site and household water capture and storage 3. Increase use of grey water 4. Increase sewer mining 5. Support water sensitive urban design (WSUD) **Improve water quality and health** 6. Improve water quality 7. Improve public health and reduce damage to waterways
4. Sustainable Businesses	**Help businesses be more sustainable** 1. Educate businesses 2. Save water in businesses 3. Businesses to prepare and implement sustainability plans **Recognise and encourage business sustainability** 4. Implement Region-wide sustainability business ratings scheme
5. Biodiversity Conservation and Protection	**Improve terrestrial and aquatic biodiversity** 1. Improve the ecological integrity of native bushland and aquatic habitats 2. Protect undeveloped rural and urban land and habitats 3. Consolidate and/or expand canopy cover and native floral diversity 4. Improve the health of our rivers and creeks **Demonstrate improvement** 5. Generate ways to assess and monitor biodiversity
6. Resource Recovery and Waste Avoidance	**Reduce waste** 1. Reduce solid waste - move towards exporting near-zero waste from the Region 2. Reduce green/organics waste
7. Transport and Traffic	**Improve sustainable transport options** 1. Greater use of public transport to reduce use of private cars 2. Increase healthy methods of travel (e.g. walking and cycling for local commuting) to reduce car use and improve community health 3. Maximise job retention and working from home to reduce car use and improve community

Although there are a number of tools to measure sustainability, they are complex, inexact and subject to varying interpretation. Consequently they are not applied consistently by councils. For the purpose of this report, two core indicators were identified to indicate the level of sustainability:

- the level of community involvement within the region in environmental activities; and
- the level of corporate involvement within the region in environmental management activities.

Accordingly, throughout this SoE report there are references to a range of projects NSROC councils are undertaking to address sustainability. Over recent years there has been an extensive effort in the NSROC region to develop new tools and approaches to move towards sustainability and highlight the fundamental links between the economy, society and the environment. These are illustrated throughout this report.

COMMUNITY CONSULTATION

North Sydney Council provides opportunities for residents, students, businesses, workers and property owners within the LGA to participate in decision making on issues of immediate and long term community interest. Recent public participation has ranged across topics from a Bin Trial to its 2020 Vision Review as well as on a proposed special rates variation and a review of Traffic Facilities. The Council has also engaged the community through consultation on the LEP, DCP and Heritage reviews as well as the Open Space Provision Policy which won the Parks and Leisure Australia's 2009 Planning Award for Excellence.

Hornsby Shire Council undertook community engagement research in June 2009 to seek the views of the 'silent majority' on a range of issues including:

- what people like and value about living in the Shire;
- how people want to be engaged and involved in the affairs and decisions of Council;
- how much engagement people want;
- where the community would like Council to focus its efforts; and
- the most effective ways for the community to find out about council news and events.

The results of the study will form the basis of the Community Strategic Plan to guide Council's efforts for the long term.

In addition, the Hornsby Shire Council Social Plan 2010-2014 was recently prepared with extensive consultation and feedback from the Hornsby Shire community including, residents, stakeholders and partners from government and non-government organisations. Surveys were distributed using a variety of methods including by post, email, one to one interviews, telephone interviews, focus groups, meetings with stakeholders and text messaging. Over 650 surveys were completed including over 150 from the general public at an event held in the Hornsby Mall. A further 300 were returned via stakeholders and one to one meetings. In total, approximately 950 people contributed to the development of this Plan.

Hunter's Hill Council regularly invites the community to provide comment and feedback on its direction and decisions. Recent community participation in decision making has involved the Gladesville Masterplan, a residents survey, a community facilities review as well as these specific events, the Council runs many committees that cover issues affecting the community: including traffic, transport, parking, bushland, sustainability, disability access, trees, memorials, events, arts & crafts, seniors and children.

Ku-ring-gai Council acknowledges the importance of good governance in an environment where a Quadruple Bottom Line approach is essential. The QBL approach facilitates delivery of high quality services to residents who increasingly wish to engage in their role as citizens as well as Council's customers.

The focus on good governance means Ku-ring-gai Council has a strong commitment to engaging its community in order to shape decisions and gather feedback on services, projects and planning. In most recent years, Council has consulted with the community on the development of a sustainability plan which underpins a 20 year Community Strategic Plan, planning for each of the six Town Centres, various Plans of Management as well as the development of a Community Facilities Strategy. This is among a range of other projects that direct services and capital works.

Council's formal consultation policy guides its work and ensures all consultation is equitable and accessible. As such, it engages the community in a range of ways, including but not limited to, the use of;

- Increased communication and reporting
- E-registers, including online opportunities such as web surveys and polls

CASE STUDY

HORNSBY/NORTH SYDNEY – Business Energy and Green Business $avings Program

The Business Energy Savings Program & Green Business Energy $avings Program were developed to assist businesses reduce their energy consumption and increase their environmental sustainability. The programs encourage businesses to reduce their energy consumption and subsequent energy costs as a sensible financial and business investment. Through the process of educating and reinforcing the notion that energy reduction is an economically sound business decision, Hornsby Shire Council and North Sydney Council aim to achieve a reduction of greenhouse gas emissions in the community.

The Business Energy Savings Program was the first of its kind in NSW and has utilised a unique alliance between Hornsby Shire Council and the private sector through a partnership with Global Sustainability Initiatives (GSI). The alliance has allowed Council to utilise the service and energy audit experience of GSI to assist each business develop energy reduction goals and achieve subsequent energy cost savings. The alliance allows Council to engage and coordinate businesses to progress through a multi-step program that includes energy auditing, technology researching, product sourcing and retrofitting of premises, with minimal disruption and time involvement for each business. The success of the Hornsby program has been transferred to North Sydney and a similar program has been rolled out with GSI.

These Energy Savings Programs have been complemented with the release of a Small Business Energy Program by the Department of Environment, Climate Change and Water (DECCW). The funding available through DECC will be available for businesses enrolled with council's existing Business Energy Savings Program and Green Business – Energy $avings Program. The additional funding available for small to medium sized business is anticipated to increase the number of businesses that will be able to implement financially viable sustainable improvements.

The two programs have currently registered 296 businesses from North Sydney and Hornsby that are interested in participating. The total potential reduction in greenhouse gas emissions from businesses presented with an Energy Action Plan is estimated to be 2633 tonnes and the projects have recently reached the milestone of implementing the recommended actions for several businesses.

The Green Business Energy $aving Program was officially launched in May with a business breakfast. Hosted by Mayor Genia McCaffery, the event was attended by over 30 local businesses. Adrian Wait (Tecnoprint), Ray Pavri (Sustainergy), North Sydney Mayor Genia McCaffery, Jeremy Maslin (GSI)]

- Community meetings, forums and information sessions
- Four reference committees that bring together local resident experts, academic and professional representatives.
- Summits and other "roundtable" opportunities

Whilst undertaking consultation builds trust with our local community, it remains clear that using the feedback gathered in long term planning equally as well as short term project delivery is critical to the success of future consultation.

Lane Cove Council carried out extensive consultation with its community throughout 2008/2009. Consultation methods included community workshops, online strategies such as web surveys and e-newsletters to more traditional methods such as letters and signs at key meeting places.

A major consultation project was the Draft Local Environment Plan, which was adopted on 4 August 2008 after two public exhibitions with a total of over 800 submissions received. This consultation earned Council the Morpheum RH Dougherty Award for "Excellence in Communication" at the Local Government Week Awards on 30 July 2008. Other consultations included the Lane Cove Bicycle Plan, Lane Cove Village Structure Plan, Little Lane Carpark Development Control Plan (DCP), Recreation Plan and Playground Strategy as well as the Graffiti Management Plan and Policy.

City of Ryde is committed to engaging with residents, businesses and stakeholders as it plans services, policies and facilities. This year, City of Ryde has embarked on the development of the Ryde 2030 Community Strategic Plan. The document will be an overarching visionary plan for the Ryde Local Government Area and will provide the framework for building community relationships by bringing people together to discuss shared issues and ideas to build strong and cohesive communities. Commencing in April 2009, the first step of the process is to engage local residents and the wider community in a meaningful way on the future of its community. Consultation and engagement activities to date have included: on-line surveys, a 24 hour 'Phone the Future' Hotline, community forums, displays in shopping centres and interactive approaches such as world café.

Willoughby City Council believes there is enormous value in providing regular, accessible opportunities for community engagement. A committed approach to proactive consultation ensures that our community is firmly involved in the decision making that influences their quality of life and their environment. In the past twelve months Council has undertaken a broad range of consultations from public forums and focus groups to on-line discussions and surveys. Early in 2009 Council undertook a community consultation program on sustainability and sustainable practices. Residents were asked a series of questions relating to climate change including describing their own experiences in trying to reduce their carbon footprint. Other recent topics for community consultation have included performing arts venues, Council's cultural policy, recreation, our libraries and the review of Council's long term community plan, the Willoughby City Strategy. In addition Council supports numerous advisory committees and community education programs. Council will continue to engage the community and other key stakeholders to maintain a collaborative, partnership based approach to local government.

COMMUNITY ACTION

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

Some of the projects undertaken throughout the region in 2008/09 are as follows:

Hunter's Hill Council supports its community and associated groups in their efforts to take action for the environment. Council has established its Sustainability & Biodiversity Advisory Committee which comprises Council staff and community members. The committee affords the community members the opportunity to make suggestions on environmental initiatives at the same time the Council advises the community members of its own initiatives. A free "give-away" of shower timers, calico shopping bags, literature and native plants at Council's annual Moocooboola Festival raises awareness of environmental programs.

The Ku-ring-gai community has been involved in developing a Draft Strategic Plan for the LGA in two ways: through a visioning exercise and through action planning workshops where opportunities, programs, projects and policies for council and partners over the short- (five years) and long-term (25 years) were identified.

North Sydney Council has a long tradition of supporting and promoting community action. Aside from the highly successful Climate Challenge, Council provides a Sustainable Living series where talks and workshops are structured in response to community need. Recent topics have included solar power, natural cleaning and permaculture gardening in small spaces. Council also continues its popular and effective Bushcare, Adopt A Plot and Streets Alive programs. The Council has two community gardens and planning for our community plant propagation nursery is well underway. NSC also runs a well attended series of talks under the Living Environment Night banner for residents of North Sydney, Hunter's Hill, Lane Cove, Willoughby and Mosman LGAs.

The Australian Conservation Foundation (ACF) partnered with **Hornsby Shire Council** to deliver a series of community workshops focussed on sustainable living as part of the GreenHome Program. The workshops were aimed at engaging the community to achieve direct energy and water savings in the home. ACF started the GreenHome Program in 2005 as a pioneering environmental education program working with the community to find individual and collective solutions to environmental issues. From tips on saving energy and reducing waste to calculating ecological footprints, GreenHome encompasses all aspects of sustainable living. The program used a variety of education tools including media, humour, real life case-studies, relatable presenters and professional adult learning techniques. Over 200 households were engaged in the program. The total megawatt hour savings from participants' efforts is estimated to be 200 Mega Watt hours (ACF, 2009).

Council is also involved in the Greenstyles Program which is a free in-home program that aims to make houses and gardens more eco-friendly and runs numerous bushcare groups with 650 active volunteers in 2008/09.

In 2008/09 **Lane Cove Council** continued with the highly successful Backyard Habitat Program, which helps residents to design wildlife-friendly backyards. The program now has 152 members. The program was Highly Commended in the Biodiviersity Conservation Award category at the Keep Australia Beautiful *Sustainable Cities Awards*.

In October 2008 Council's annual environment expo Sustainability Lane was run for a second year. Thousands of visitors enjoyed the range of stalls and entertainment offered on the day. Residents also participated in a range of other programs such as regular composting and worm farming workshops, waste and recycling tours, and a popular Green Building and Renovating talk with expert Michael Mobbs.

City of Ryde supports many partnership events which promote positive sustainability action across the Ryde community. Building on a successful workshop series in 2006, the Australian Conservation Foundation delivered another round of GreenHome sustainability workshops in November 2008 with over fifty residents attending the four-part program. Ryde also launched its online *Sustainable Living Guide* on the eve of World Environment Day 2009. The guide contains a comprehensive list of easy and simple actions we can all take to minimise our impact on the environment

Willoughby City Council recognises the growing concern within its community around the potential impacts of climate change and the need to reduce the community's greenhouse gas emissions. Since the introduction of the new e.restore environmental levy in July 2008, Council has worked to encourage community action and participation in sustainability programs. Willoughby City Council has supported the formation of community groups to enable networking and encouraging neighbourhood based projects. This has been achieved through the Council's facilitation of Sustainability Street groups and the ongoing delivery of community education through workshops and events.

Council recognises the multifaceted nature of sustainable living and the different environmental interests of our community. Residents have been able to improve their local environment with Greenstyle, a free in-home program that aims to make houses and gardens more eco-friendly. The Willoughby community is also very active in bushland regeneration and preservation through its Bushcare program. There are currently 33 Bushcare groups, 6 Parkcare Groups, 4 Streetcare Groups, 1 roving Bushcare Group (the Flying Squad) and 1 roving Lanecare Group. In 2008/2009, Willoughby City Council's Bushcare teams also joined forces for Bushcare's Major Day Out, where 45 Bushcare volunteers participated in a large scale project to rid weeds from a sizeable area of bushland. The event provided an excellent opportunity for new Bushcare volunteers to learn from experienced Bushcarers and strengthened the social connections of our volunteer community, while improving the health of the natural environment.

CORPORATE ACTION

Each NSROC council has adopted mechanisms to ensure that their operations not only focus on achieving sustainability but also provide opportunities for staff to achieve environmental outcomes. This includes incorporating sustainability imperatives into councils' day-to-day commercial transactions, business and procurement activities.

Following the development of Integrated Planning and Reporting by the Department of Local Government in early 2009, councils are now tasked with formally elevating environmental management to a strategic level as part of the new "whole of community" planning process.

Councils have been active in developing long-term management frameworks and goals which help their communities and council achieve long-term sustainability outcomes. NSROC councils have progressively adapted their corporate management structures to accommodate the move towards sustainability. Some examples of council action include:

Hunter's Hill Council has undertaken several water saving initiatives at Council facilities in 2008/09. The administration centre, depot facilities building, Boronia Oval grandstand and Sailing Club building have had water recycling and tank systems installed. Energy savings have been achieved by the installation of low energy consumption light fittings in the administration building.

Ku-ring-gai Council conducted consultation with staff in the development of a draft strategic plan through workshops, team meetings and an internal survey to assess their knowledge and understanding of corporate sustainability and what issues they believed would contribution toward the sustainability of the local area.

Aside from the highly subscribed Green Business Energy Saving Program (see case study) **North Sydney Council** is a partner in the CitySwitch program to encourage tenants in commercial office buildings to reduce energy consumption. NSC has a total of 21 businesses in this program. NSC is currently undertaking a review of our Greenhouse and Water Action Plans as well as completing actions from our Energy and Water Savings Action Plans. Council is also introducing a Sustainability Assessment Toolkit to ensure projects consider all aspects of sustainability in their formulation. The Council Chambers has achieved a 4 star energy and 3 star water ratings under the NABERs scheme.

The Sustainable Procurement Committee at **Hornsby Shire Council** is currently working to ensure that sustainable procurement becomes standard practice by arranging training and education programs for staff and incorporating sustainability criteria into the tendering process. A Sustainable Procurement education day was held in August 2008 showcasing several key suppliers and their sustainable product range.

Hornsby Shire Council developed an Advancing Greenhouse Purchasing and Carbon Neutrality Framework which is a generic framework for local government organisations looking to further sustainable procurement within their organisation. This has been circulated to NSW councils for their use. Following this, a Sustainable Procurement Policy was endorsed by Council in April 2009 and a training course was conducted for several key staff in April 2009 to ensure that the Policy is put into practice.

In order to support **City of Ryde's** project planners, Council has developed a Project Sustainability Assessment Protocol. As well as assessing the sustainability impacts of their proposals, the Protocol also encourages project planners to identify opportunities for improving their sustainability performance in future activities. It asks project planners to assess their plans against Council's four key sustainability indicators i.e. environment, people (social), governance (legal) and assets (economic). The Protocol allows planners to assess the impact of their project in line with the Key Outcome Areas identified in Council's Management Plan. From that assessment they will get an indicative sustainability "score" against each of the key indicators and a total project sustainability score. The Protocol is another tool that will be used by the City of Ryde to encourage the development of a culture of sustainability.

In July 2008, **Willoughby City Council** introduced a new levy for environment and sustainability initiatives which raises $4.25M annually. The levy was introduced after extensive community consultation and subsequent approval from the Department of Local Government. This levy, known as 'e.restore 3' builds on two previous environmental levies (e.restore 1 and 2) which delivered a number of environmental programs which predominately focused on bushland restoration and stormwater management.

e.restore 3 continues to address bushland and stormwater issues, however the scope of levy funded projects has been expanded to include broader sustainability issues with a strong focus on climate change. During the 2008/2009 period, Willoughby City Council worked to ensure the continuation of ongoing environmental programs whilst working to embed sustainability into the organisation's operations. Willoughby City Council has developed a suite of new

CASE STUDY

HUNTER'S HILL COUNCIL – Sustainable Key Performance Indicators

The Performance Report supports the Sustainability Plan. This report is a means to measure the performance of Council in its operations impacting on the environment and environmental services to the community.

The performance report card has been developed using MS Excel and provides an overview of Council's performance for the reporting period. The process of measurement and indicator verification was established with assistance from the University of Technology Sydney (UTS) Institute for Sustainable Futures (ISF). ISF recommended a series indicators that would align the identified outcomes in the Councils Sustainability Plan 2008 with Data already available in Council. This ensured a coherent set of environmental Indicators that enables Council to measure it performance in achieving the identified Outcomes and Goals of the Sustainability Plan.

Data is collected for each Indicator identified in this report for each of the six Target Areas of Environmental Performance:

- Energy
- Water
- Waste
- Biodiversity
- Development
- Education

TARGET AREAS

Each target area has an associated strategic goal and a series of outcomes toward which strategies are devised and indicators used to measure Councils achievement and progression towards the goal and outcome. The reporting reflects trends towards or away from the target area goals in addition to the vision, purpose and values of the organisation as a whole.

Council is of the view that by developing a separate yet integrated Sustainability Plan supported by a rigorous data set as represented in the Performance Report, that the project demonstrates leadership in best policy and management practice, openness and accountability.

The Performance Report has created benchmarks in areas where an improvement in organisational performance can be measured and reported, an area which is both lacking and under-developed within the industry.

programs to reduce Council's organisational carbon footprint and assist the community to respond to climate change. To help communicate this new direction, Council launched the *ClimateClever* community education campaign. An important cornerstone of the *ClimateClever* campaign is ensuring Willoughby City Council demonstrates clear leadership to our community in sustainable practices and in responding to climate change. During 2008/2009, Council has worked to reduce energy consumption through the installation of voltage reduction devices at key buildings and through staff education. Council also introduced a new carbon neutral fleet policy to improve the fuel efficiency of its vehicle fleet by shifting towards four cylinder and hybrid vehicles and purchasing an accredited offset to cover operating emissions. Council's administration building and Chatswood Mall now source electricity from 100 per cent GreenPower.

In 2008/09 **Lane Cove Council** continued to purchase 100% GreenPower for the Administration Centre, Community Centre and Lane Cove Library. Greenhouse gas emissions from Council's light and heavy vehicle fleet were offset through the Greenfleet program. As part of Council's strategy to reduce energy consumption, lighting improvements were targeted in 2008/09. LED lights were installed in the Administration Centre, Aquatic Centre, Newslands Park and the Tambourine Bay Boat Shed. Occupancy sensors were installed in the Administration Centre.

Lane Cove Council investigated options to incorporate ecologically sustainable design principles into the new Library facility. Energy efficient heat pumps, an energy efficient heating, ventilation and air conditioning system, an energy efficient lift and non-potable water system for bathrooms were purchased ready for installation in the new facility in late 2009.

Lane Cove Council worked its through Water Savings Action Plan, completing actions such as the installation of vandal proof and spring loaded taps in parks and ovals, capping unused taps in parks and reserves, and the installation of dual flush toilets and water efficient shower heads in high use public change rooms.

2

Human Settlement

Human Settlement

The history of non-indigenous settlement in the region starts immediately after Sydney was first colonised in the late 18th century. However substantial settlement did not occur until almost 100 years later. In this period, development followed the railway lines and the main arterial roads linking Sydney city with the small settlements on its outskirts.

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

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

URBAN DEVELOPMENT AND GROWTH

Non-indigenous settlement in the NSROC region started shortly after Sydney was first colonised in the late 1700s. However substantial settlement did not occur until almost 100 years later with the development of railway lines and arterial roads linking Sydney

Historically development has been constrained in the northern and north-western parts of this area of Sydney by the natural topography and extant bushland preservation areas. Urban development has generally proceeded along the ridgelines, with the steeper areas adjacent to the Hawkesbury River with its tributaries remaining undeveloped except for small residential settlements and commercial hubs supporting water-based commercial activities. Although some former rural areas have been developed for residential purposes, large areas within the Hornsby Shire Local Government Area (LGA) have remained primarily rural. The high cost of delivering urban infrastructure, and the importance of maintaining productive agricultural lands are major constraints to urban growth in these areas. In the southern part of the NSROC region there is a high level of residential and business concentration. The region has several business and commercial hubs including North Sydney, Chatswood, Ryde and Hornsby: and special business parks, education and health areas of Macquarie Park, Macquarie University and the Royal North Shore Hospital precinct.

The NSROC area, like the rest of Sydney, has been under substantial and continual pressure to accommodate a rapidly growing population. The most pressing growth pressure is expressed in the NSW Metropolitan Strategy. The targets in this land use policy challenge the region's historical growth patterns and values. The strategy, announced by the State Government in 2004, has set growth targets for all of Sydney and has divided these targets into regions. The proposed growth target for the NSROC region is 56,000 households which equates to about 130,000 people over the 25 years of the Metropolitan Strategy.

Two sub-regional strategies covering the NSROC region are the Inner North Sub-regional Strategy (North Sydney, Lane Cove, Ryde, Mosman, Willoughby and Hunter's Hill) and the North Sub-regional Strategy (Ku-ring-gai and Hornsby). As noted below in Figure 6, the strategies set specific dwelling and employment targets for each council.

Figure 6: Dwelling targets and employment capacity targets for the Inner North and North Sub-Regional Strategies, NSW Department of Planning, 2007

Local Government Area	Dwelling Target	Employment Capacity Target
Hunter's Hill	1200	300
Hornsby	11,000	9,000
Lane Cove	3,900	6,500
Ku-ring-gai	10,000	4,500
North Sydney	5500	15,000
Ryde	12,000	21,000
Willoughby	6,800	16,000
Total	56,400	72,300

The State Government directed that every council must create a new Local Environmental Plan (LEP) in accordance with a standardised template and must conform to the objectives and directions of the relevant sub-regional strategy including these targets. As the LEP is the principle strategic planning document for local government, this process will ensure uniformity across the region for all councils covered by each individual strategy.

Although strongly supporting a regional strategic planning process for Sydney's growth, NSROC has consistently expressed concerns regarding the limited amount of infrastructure provision identified in the overall Metropolitan Strategy and the draft Sub-regional strategy that has now been released. NSROC's concern is that the infrastructure is inadequate to sustainably address the growth envisaged in the strategy, particularly as growth targets are identified for a 25-year period, but infrastructure is only identified for the next 10 years under the State Infrastructure Strategy 2008-2018. The NSROC councils remain in the invidious position of having to plan for 30 years of population growth with the commitment of only 10 years worth of infrastructure.

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

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

Land Use and Construction Rates

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

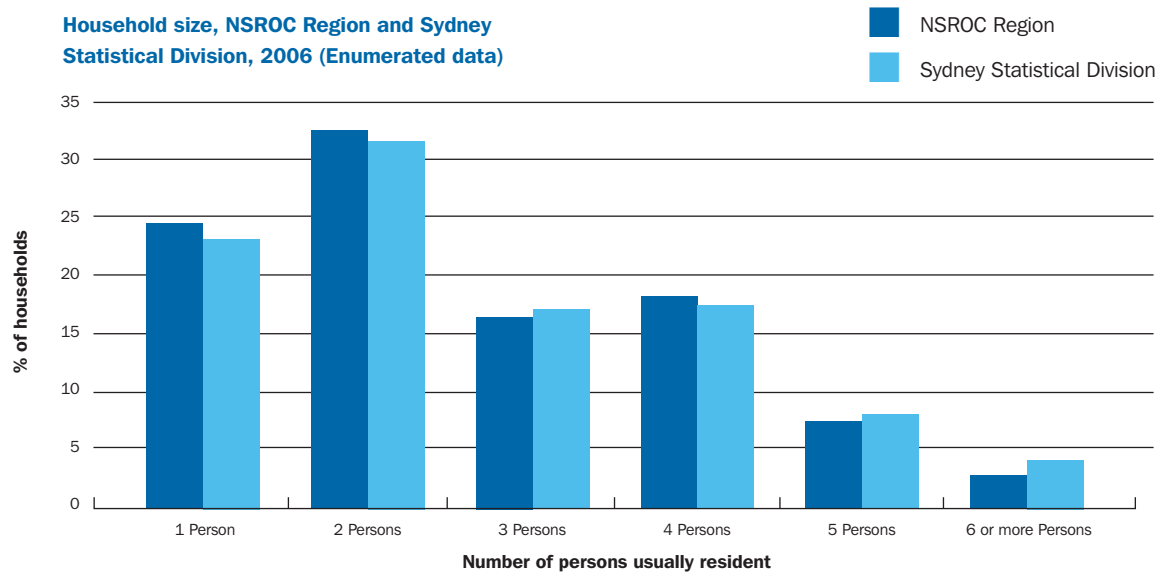
As indicated in Figure 7, residential land makes up the largest portion of land use, (between 40 and 50%) for NSROC councils excepting Hornsby where 49% of land is national park.

Figure 7: Percentage of land use by LGA in the NSROC region in 2008-09

Council	Business	Industrial	National Park	Open space	Residential	Roads	Special uses	Rural	Unzoned/ Other
North Sydney	6.3	0	0	16.8	44.7	25.1	5.4	0	0
Lane Cove	1.5	6.1	0	15	51.8	19.6	5.8	0	0.30
Hunter's Hill	3	0	0	13	50	17	17	0	0
Ryde	8.5	0.8	6.3	9.3	42.2	18	14.9	0	0
Ku-ring-gai	0.6	0	19.7	16.5	43.9	12.2	3.7	0	3.40
Hornsby Shire	0.4	0.4	49.9	5.2	9.4	NA	3.3	15.7	15.7
Willoughby	2.38	4.29	0.35	20.1	49.35	18.21	4.46	0	0.86

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 Figure 8 illustrates two person households are the largest group in the NSROC region (30%) followed by one person households (24%). Larger groups of 3 or more people make up the remaining 45% of households. The largest increases since 2001 have been to the number of one and two person households. As the size of families decreases and more people live alone or in couples, there has also been a corresponding rise in the number of one-bedroom and studio apartments.

Figure 8: Average number of people per household in the NSROC region 2006



Source: Australian Bureau of Statistics. 2006 Census of Population and Housing (Emunerated)

Much residential intensification has taken place in existing commercial zones, especially around railway stations. For example, St Leonards was rezoned in 2001 from a low-scale industrial and commercial centre to a mixed-use zone. This brown field rezoning has allowed wholesale redevelopment of the area into a medium-to high-rise commercial and residential centre with significant increases in the working and residential populations. Significant urban redevelopments also have occurred adjacent to rail stations in Chatswood and West Ryde. The predominance and surges in residential development applications over the last 4 years is illustrated in Figure 9 and 10.

Figure 9: Number and type of development applications (DAs) in NSROC area in 2008-09

Council	Number of Commercial DAs	Number of Industrial DAs	Number of residential DAs	Number of aged persons housing DAs	Other
North Sydney	153	0	358	2	201
Lane Cove	41	11	328	0	17
Hunter's Hill	6	0	162	2	0
Ryde	275	12	703	2	26
Ku-ring-gai	70	0	952	6	144
Hornsby Shire	119	47	1345	24	414
Willoughby	297	62	600	1	45
NSROC region	961	132	4448	37	847

Figure 10: Number of new dwellings in the NSROC region in 2008-09 and previous years

Council	New dwellings 2008/09	New dwellings 2007/08	New dwellings 2006/07	New dwellings 2005/06
North Sydney	6	29	20	480
Lane Cove	48	35	10	45
Hunter's Hill	27	13	16	8
Ryde	445	479	7	178
Ku-ring-gai	126	621	126	258
Hornsby Shire	383	390	640	670
Willoughby	148	65	25	216
NSROC region	1183	1632	844	1855

Responding to the Impacts of Development

Regional residents have been active in ensuring that the natural heritage values of the region are protected and managed sustainably in the on-going push for further urban consolidation. In the past, both local residents and councils in the northern Sydney region have reacted strongly to the NSW Government's attempts to impose blanket policies aimed at increasing urban consolidation. These seek to maximise infill through dual occupancy and allow three-storey apartment buildings in most residential areas.

Councils in the region are working closely with their communities and the State Government to plan future growth based on the prescriptions of the metropolitan plan and its sub regional strategies. In 2006 NSROC completed a Northern Sydney Sub-regional Planning Strategy, which provided overarching direction and policies for development at a regional level, as well as identifying infrastructure needs and opportunities over the next 30 years. This strategy covers the period 2004-31, and sets regional and council level housing and employment targets at 10-year intervals for the period of the Metropolitan Strategy as well as identifying major infrastructure projects which will help make the proposed population growth possible. This document has been exhibited by the NSROC councils and adopted by the NSROC Board, and can be viewed at www.nsroc.org.

This macro analysis highlights future needs and sustainability pressures which NSROC councils must address. In turn, councils are developing their planning controls which embed sustainable living features such as those included in Ryde Council's Local Environmental Plan for Gladesville.

CASE STUDY

RYDE COUNCIL – Gladesville Local Environment Plan (LEP)

The Gladesville Town Centre and Victoria Roads Corridor draft planning controls are based on the shared vision of the City of Ryde and Hunter's Hill Councils. The goal is to revitalise the town centre and breathe life into the Victoria Road corridor and to create a more inclusive and attractive place in which to live, visit, work and invest.

The draft planning controls provide a framework for the future and transform the Gladesville Town Centre and the Victoria Road corridors. This is achieved through a diverse mix of retail, commercial and residential development, cohesive built forms, enhanced pedestrian links and public domain spaces. The Local Environmental Plan proposes a new floor space ratio and predominantly five storey height controls throughout the corridor with some higher intensity development in suitable areas. Public open spaces will be enhanced with the Development Control Plan proposing streetscape improvements, tree planting, widened footpaths and new plazas. There is also a proposal to create a number of laneways and pathways that will provide new links between residential and retail precincts away from Victoria Road.

NSROC councils adhere to the NSW Government's BASIX process 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, 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. BASIX also provides greater market certainty for sustainable industries and standardises domicile environmental performance across the state. Examples of sustainable housing features that help in obtaining a BASIX certificate include:

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

BASIX applies to new homes and residential unit blocks and to certain upgrades and redevelopments of existing residential buildings. BASIX is yet to apply to commercial and industrial buildings. However NSROC councils are assisting and encouraging development and refurbishment of commercial and industrial sites with key sustainable features. The tri-generation plant in a commercial office block at 101 Miller Street in North Sydney is one such example.

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.

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

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

- threaten the survival of highly valued plant or animal species
- degrade the quality of the water or air vital for the safe and sustained survival of all life in the region
- result in an increase in intrusive noise
- destroy the aesthetic appeal of the area.

CASE STUDY

NORTH SYDNEY COUNCIL – 101 Miller Street Tri-generation

The property industry is demonstrating innovation and leadership in energy efficiency in North Sydney. The Mirvac Property Trust and Eureka Funds Management owned 101 Miller Street has undergone a $40 million refurbishment, with the ongoing environmental impact of the building given key consideration for the project.

In an Australian first for an existing premium building, a state of the art tri-generation plant has been installed at 101 Miller Street through a partnership with Cogent Energy and with support from the NSW Government. The 101 Miller Street initiative demonstrates commitment to introducing new technologies and practical measures to reduce greenhouse gas emissions, improve energy efficiency and increase reliability of an asset's energy systems for the tenants.

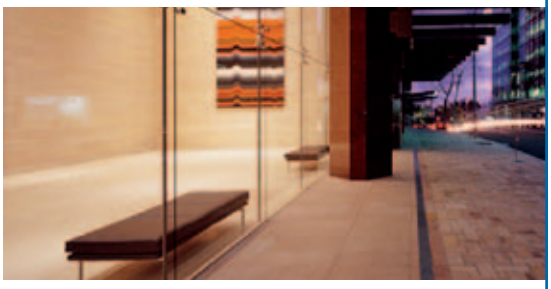
Tri-generation is the simultaneous generation of electricity, waste heat energy for heating and waste heat conversion for cooling through an absorption chiller by using a natural gas powered generator. The tri-generation plant delivers:

- a reduction in electricity costs to the building and tenants when compared to current market prices for grid power;
- the ability to provide the building and for the tenants with full back up power supplies for continuity of business;
- an efficiency of 75 – 80 per cent compared to grid power which is approximately 30 per cent;
- a more reliable source of energy during peak demand periods.

In addition to the tri-generation plant, the refurbishment of the 16 year old building also included tenant metering and electrical sub metering for plant and equipment and office lighting zoning for flexibility and efficiency.

The results are impressive; the building has reduced its peak energy demand on the electricity infrastructure by 100%; achieved a 5 Star Green Star rating (Office Design V2); and produced a simulated NABERS Energy rating of 5 Star + an additional 40% CO2 saving.

The achievement of 101 Miller Street's was recognised by the industry; receiving the highly contested Award for Sustainable Development at the 2009 Property Council of Australia Rider Levett Bucknall Awards for Innovation and Excellence. Importantly, the refurbishment has also driven strong tenant demand, demonstrating the benefits to building owners of providing sustainable workplaces.

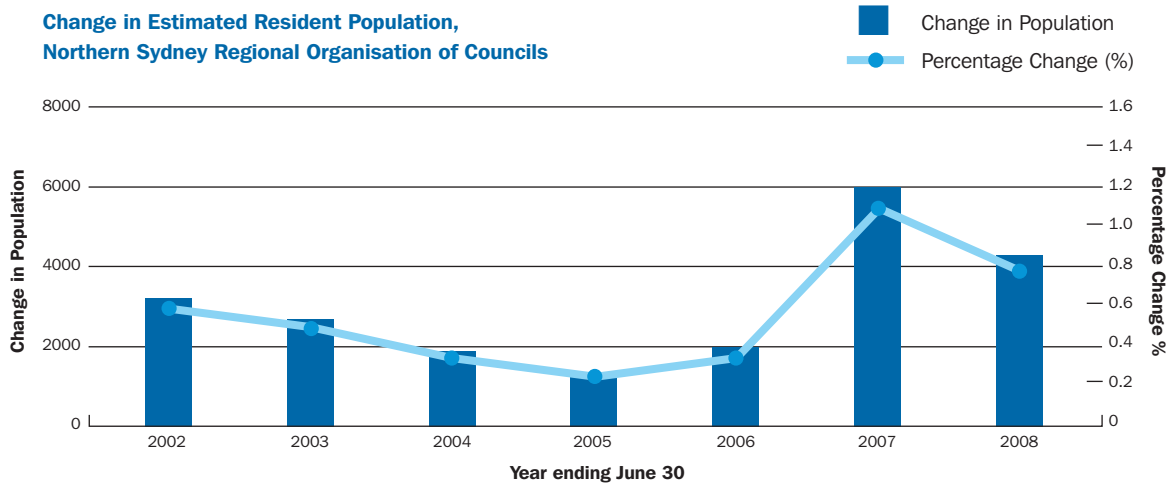


Population Data for the Region

Below are estimates of the population of the NSROC region based on figures provided by the Australian Bureau of Statistics (ABS). Although the region has experienced significant growth in the past decade, the data illustrates that population growth is slowing. This may be as a result of the overall decline in the housing market in Sydney which has resulted in fewer new homes being constructed. It may also be influenced by the region's changing demographics, with high property prices meaning fewer families moving in, and thus household size (and hence total population growth) is decreasing.

The 2001 to 2006 ABS data indicated a pronounced dip in population growth. However, estimates suggested a slight rise and increase in population in 2007 and 2008 as shown in Figure 11.

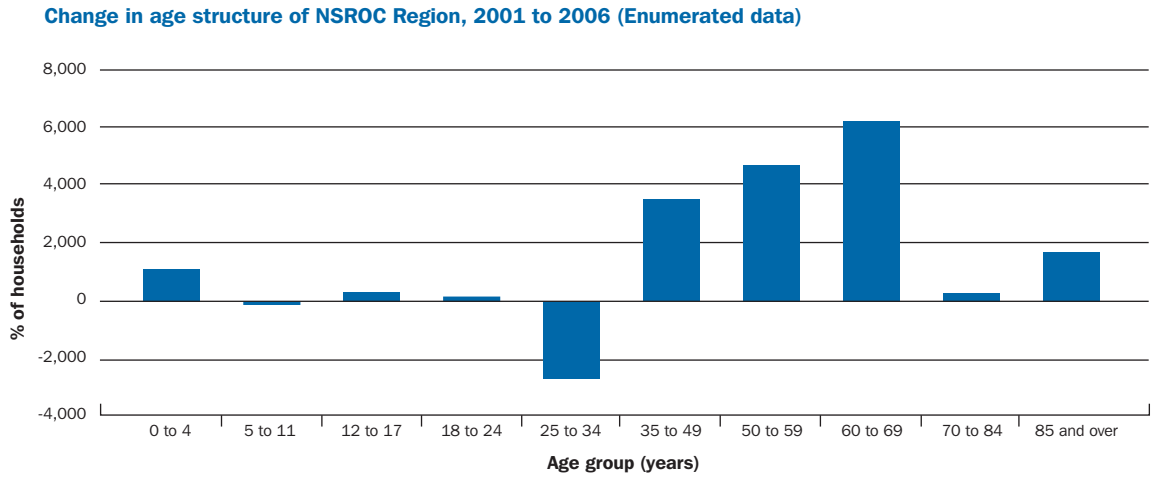
Figure 11: Change in NSROC Resident Population 2002-2008



Source: Australian Bureau of Statistics. 3235.0 – Population by Age and Sex, Regions of Australia. 2007

In Figure 12, analysis of the age structure of NSROC region in 2006 compared to the Sydney Statistical Division shows that there was a smaller proportion of people in the younger age groups (0 to 17) but a larger proportion of people in the older age groups (60+). Overall, 21.9% of the population was aged between 0 and 17, and 18.8% were aged 60 years and over, compared with 23.6% and 16.7% respectively for Sydney Statistical Division.

Figure 12: NSROC Region Age Structure changes 2001-2006



Source: Australian Bureau of Statistics. 2006 and 2001 Census of Population and Housing (Emunerated)

CASE STUDY

RYDE COUNCIL – Macquarie Park Sustainable Development Initiatives

Often described as Australia's "Silicon Valley", Macquarie Park is home to some of Australia's top 100 companies, particularly in IT& T, pharmaceuticals, medical research and media. It is also the location for Macquarie University and the Macquarie Shopping Centre. Macquarie Park is called a Specialised Centre in the State Government's Metropolitan Strategy because it "performs a vital economic and employment role" in Australia.

The number of office workers and students in Macquarie Park is expected to more than double in the next 25 years. This presents some big challenges, particularly in relation to transport because most people commute to Macquarie Park by car and the roads can be highly congested at peak hour.

To fulfil its growth potential Macquarie Park needs to change from a car dependent, homogenous industrial park into a pedestrian and public transport orientated, vibrant and sustainable mixed business centre. The State Government has invested $2.4 billion in the construction of the Epping to Chatswood Rail Link which includes three new stations in Macquarie Park. Additional priority bus lanes are also being implemented in Macquarie Park along Lane Cove Road and sections of Epping Road.

To compliment the State Government's investment in Macquarie Park, the City of Ryde is implementing a major planning, public domain and community infrastructure program over the next 20 years. Much of the infrastructure will be funded by the development sector through the progressive redevelopment of Macquarie Park. Works will include an integrated pedestrian and cycle network, new plazas and parks and the implementation of best practise urban design, particularly around the three new stations, to make the area attractive, vibrant and safe for pedestrians.

Council is also reviewing its planning controls to ensure that commercial development in Macquarie Park achieves best practise in sustainable building and water sensitive urban design. Council is planning an incentive scheme which will encourage developers to achieve the Green Building Council's 5 star rating, or higher.

As a result of this coordinated public and private sector activity, Macquarie Park is set to become a vibrant, efficient, sustainable and nationally significant business centre.

Responding to the Challenge of Population Growth

NSROC has various concerns arising from the current demographic growth and age trends:

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

As noted previously the Metropolitan Plan's accompanying State Infrastructure Strategy has a 10 year horizon on infrastructure requirements compared to the Metro plan targets of 25 years. The Metropolitan Plan and sub-regional plans take into consideration the age demographic changes and the accompanying housing and amenity needs and suggests that councils adjust housing mixes to reflect these needs. Recent discussion papers have been released by the State Government on employment lands development as part of the planning mechanisms for delivering on employment targets. However the environmental ramifications of these matters have not been explored.

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

ABORIGINAL HERITAGE

Information on traditional indigenous life and activities in the Sydney area comes from many sources. As well as the archaeological record, 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.

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

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

Threats to Aboriginal Sites

Threats to Aboriginal heritage sites come from development, damage due to ignorance of the sites, excessive visitation, vandalism and erosion. A key challenge for NSROC councils is the timely identification of sites and their preservation.

Figure 13 indicates Aboriginal sites across the region.

Figure 13: Identified Aboriginal Sites in NSROC Region 2008

Council	Identified Aboriginal sites	Registered Aboriginal sites	New sites under investigation
North Sydney	68	68	3
Lane Cove	91	69	22
Hunter's Hill	72	72	0
Ryde	14	59	1
Ku-ring-gai	92	80	0
Hornsby Shire	235	235	0
Willoughby	151	155	0
NSROC region	723	738	26

Preserving and Protecting Aboriginal Sites

NSROC councils have developed a number of strategies aimed at preserving the areas Aboriginal heritage. Comprehensive registers of sites throughout the region provide information crucial to site management. An example of a recent promotion and preservation initiative for Bar Island aboriginal heritage by Hornsby Council is outlined below.

There are few new sites identified on an annual basis as the frequency of identification of sites often depends on development activities. **North Sydney Council** is currently investigating a number of sites on Balls Head which have been uncovered as a result of works at the old Coal Loader site. The carvings have yet to be fully investigated but include a "spirit man". These newly discovered carvings add to existing engravings of a whale, a fish and the "spirit man".

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

In 2002, the Aboriginal Heritage Office (AHO) identified 67 sites in **Lane Cove Council area**, mainly shelter midden sites. In recent years additional sites have been identified and investigated further by the AHO. The list of Aboriginal Sites in Lane Cove was updated in 2008 and a further 20 sites added, including 4 shelter middens and 3 middens. Another 13 sites have been identified as Shelter Potential Archaeological Deposits prior to further investigations.

CASE STUDY

HORNSBY SHIRE COUNCIL – Bar Island

Working with the Guringai Tribal Link on Bar Island

Bar Island is a small island located near the junction of Berowra and Marramarra Creeks within the Hawkesbury-Nepean River and has been listed on the Register of the National Estate. Council has been conserving the islands Aboriginal and European heritage including the cemetery, former church and school. Previously Council restored the chimney (the only remaining part of St John's Church), graves and memorial, as well as bushland and saltmarsh and addressed erosion concerns.

The current project was undertaken because the Hornsby Aboriginal and Torres Strait Islander Consultative Committee was concerned about impacts of island visitors on the Aboriginal midden. Council obtained a Caring for our Country Community Coastcare grant to undertake midden restoration with the Guringai Tribal Link and the local community.

In this remote location, visitors arrive by boat and climb up the midden to visit the island. This disturbance has allowed weeds to invade. Although many previous tracks had been closed and erosion controlled, the current project re-routed remaining unnecessary tracks away from the midden, constructed a new track to direct visitors and linked it to an existing track leading to the historic sites.

The track route and design was planned and implemented with the traditional Guringai owners and the project has been implemented with advice from the local historian and other stakeholders from the Brooklyn community. Assisted bush regeneration occurred in the surrounding woodland and saltmarsh and restored areas were protected by installing the new track and brush matting of old tracks.

NON-ABORIGINAL HERITAGE

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

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

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

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

Heritage Sites in the NSROC Region

The following is a summary of heritage areas and sites within each LGA.

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

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

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

Willoughby City Council contains 230 listed items, which include ten items on the State Heritage Register and 220 items of local environmental heritage. The Willoughby LGA has twelve conservation areas with approximately 4,100 properties. The Willoughby Heritage Advisory Committee continued to meet throughout 2008/2009 to discuss policy and information issues. The Committee comprises councillors, council staff and representatives from other local community organisations.

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

Ku-ring-gai Council area comprises a rare blend of fine domestic architecture within a landscape of indigenous forests and exotic plantings and gardens. Ku-ring-gai has houses designed by many of Australia's prominent 20th century architects which have influenced the mainstream of Australian domestic architecture nationally, including John Sulman, Howard Joseland, Hardy Wilson and Harry Seidler. The LGA contains 28 areas classified by the National Trust as Urban Conservation Areas. Of those, 16 have been reviewed in detail by the council as potential conservation areas. There are about 700 individual items listed in Schedule 7 of the Planning Scheme Ordinance. One small precinct is listed as a Heritage Conservation Area. Twenty Two items are included on the State Heritage Register, managed by the NSW Heritage Council. The draft Ku-ring-gai Town Centres LEP proposed 15 Heritage Conservation Areas and 58 new heritage items.

Protecting Our Heritage

Councils in the NSROC region continue working with the community to protect, manage, maintain and review local heritage sites. This is enhanced by the building of heritage information databases and the development and implementation of LEPs and heritage conservation plans. The NSROC councils also work together to share data and resources to maximise protection of these heritage sites. Some recent initiatives of North Sydney, Willoughby, Hornsby and Hunter's Hill are highlighted.

North Sydney Council established the North Sydney Heritage Centre within the Stanton Library in 2004. It operates as the hub for the research and interpretation of the heritage and history that council believes is fundamental to the preservation of a sense of community and place. Records held there inform a wide variety of heritage related management plans and studies. The Centre's Historical Services staff organise public programs, such as guided walks, research and the installation of historical plaques and maintenance of monuments at St Thomas Rest Park – the oldest European burial ground on the North Shore.

Staff also manage council's various historical collections, from photographs to archival records, costumes to archaeological material. Professionally-curated exhibitions using these are mounted within the Heritage Centre and at the historic house, Don Bank Museum to enhance the understanding of local history and heritage. In 2008 to 2009 Historical Services staff prepared exhibitions on the history of the North Sydney Bears rugby league team, the boat sheds of Lavender Bay and a display of original photographic prints dating back to 1863. Council's Historian wrote a history of the impact of the First World War upon the local area, '*Was thinking of home today…*': *North Sydney and the Great War.* A Department of Veterans Affairs grant was used to conserve a rare and remarkable 1919 photographic honour roll featuring the portraits of 107 Great War volunteers from the North Sydney Tram Depot that was featured in the book.

CASE STUDY

NORTH SYDNEY – Graythwaite Estate

The Graythwaite Estate located in North Sydney consists of a three-storey Victorian sandstone mansion set in six acres of landscaped gardens. It is heritage listed and has expansive views across Sydney Harbour to the Royal National Park and the Blue Mountains. Graythwaite Estate was gifted to the State Government as a convalescent home for wounded Anzacs. It was operated as a nursing home war by the Red Cross until 1980. In 1994, NSW Health initiated the sale of the estate with proposed redevelopment of garden areas for housing.

North Sydney Council lobbied the state government and the Commonwealth to keep Graythwaite in public hands and Council supported weekly volunteer gardening on the grounds until the end of June 2008. Council has continued to mow the lawns under contract in a continuing effort to attract visitors.

Before the last federal election the local federal representative promised $25M to buy and restore Graythwaite.

In November 2008 the NSW Supreme Court heard cy pres arguments from North Sydney Council and health care providers which included preservation of the estate, and an alternate scheme presented by NSW Health and its local area health services on the other. The scheme chosen as the most suitable was

Graythwaite circa 1875 with the Dibbs family

the Department of Health plan. The Court ruled that NSW Health had to sell Graythwaite before November 2009 and use the proceeds to build a specialist rehabilitation unit at Ryde Hospital.

In late October 2009, the State Government announced that it was selling the estate to The Shore School for $35.2 million. The School has said it will restore the mansion and retain the grounds as open space.

The School outbid the Federal Government, which kept its pre-election promise and put in a bid for the site. The Federal Government's proposal would have allowed Mater St Vincents Health to operate rehabilitation services on the site and the extensive grounds to be used as parkland under the care and control of North Sydney Council.

CASE STUDY

HUNTER'S HILL COUNCIL – The Priory Bushcare Group

The Priory Group was formed in October 2008 to restore the gardens and remove invasive weeds surrounding the historical buildings known as The Priory at Hunter's Hill.

The Priory built in 1835 was formerly a farmhouse, residence for the Marist Fathers and part of the Gladesville Psychiatric Hospital. Hunter's Hill Council now has care, control and management of the buildings and plans to convert The Priory into a cultural centre.

This volunteer group consists of local residents of Hunter's Hill Council. Before the formation of the group, current members were working voluntarily in the gardens uncovering a stone wall and pathway to The Priory.

The Priory Group meets once a month on a Wednesday. Activities include: weeding and mulching garden beds; removal of Tecoma from the stone walls surrounding the buildings; removal of Morning Glory and woody weeds; and removal of weed debris and dead branches.

The Priory Group in consultation with Hunter's Hill Council is working to preserve the old stonewalls, steps and pathways and restore plants likely to have been present in the original gardens.

Willoughby City Council has been working to conserve the Walter Burley Griffin Incinerator building which is listed on the State Heritage Register. The aim is to enable the adaptive reuse of the building, allowing community access to a café, meeting room, gallery space and artists' studios.

Relics salvaged from the demolished Chatswood Railway Station and not incorporated in the Chatswood Transport Interchange heritage interpretation or the restoration of the signal box were made available to various heritage groups. Willoughby City Council Library's Local Studies Department and the Willoughby District Historical Society chose various items which will be used as features in future displays.

The development application approval for the former ABC site included a condition of consent in relation to heritage installation and heritage interpretative measures on the site. Negotiations have been progressing between Council and the developers in relation to the commissioning of major artwork, secondary artworks, interpretative markers and street names that will convey the former use of the site and its historical significance.

Hornsby Shire Council was the 2008 Winner of the Keep Australia Beautiful Sustainable Cities Award for Best Heritage Management by a Metropolitan Council. In 2009, Council acknowledged the efforts of property owners, individuals and groups involved in restoration works and conservation efforts by presenting them with certificates and plaques at a Council meeting and publishing the winners in the Bushland Shire News. One of the winners was the Anglican Retirement Village in Castle Hill for the Restoration of the Rural Silos.

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

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

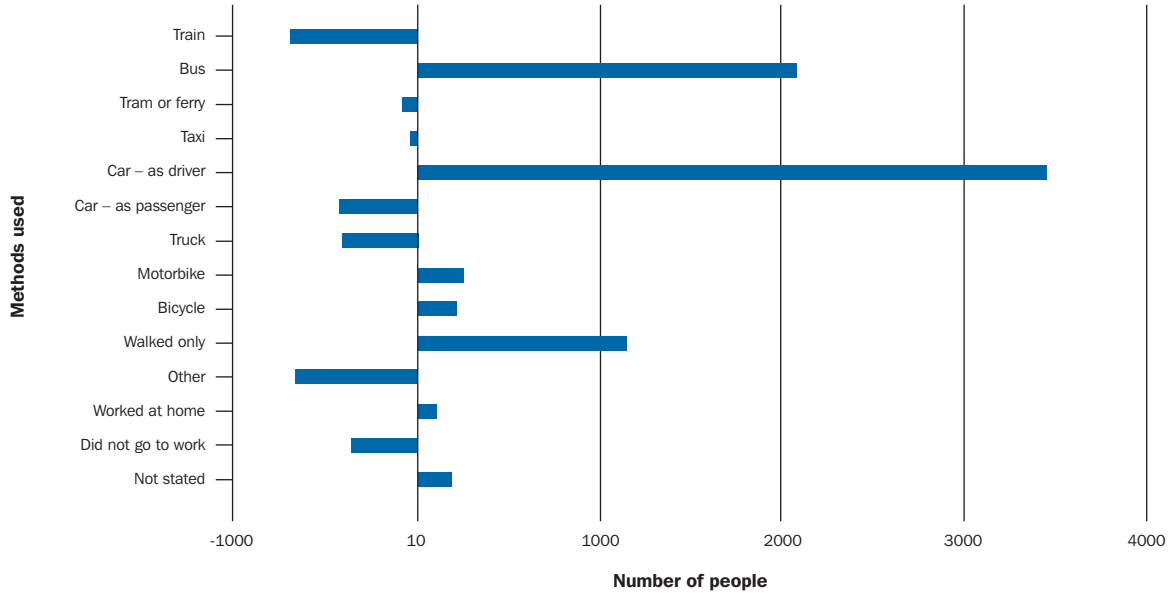
The building itself is an exceptional example of the Georgian style (1857) designed by Colonial Architect, William Weaver. Following on from this, in c1880, a neo-style addition was added, built for lawyer Thomas Salter, the third section of the Priory's unique architectural complex. The Priory is an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

URBAN PLANNING AND TRANSPORT

Sustainable urban planning and transport must strike the right balance of effective and economic people movement with transport modes offering low energy and emissions.

Sydney continues to struggle with the right mix of transport modes. In Northern Sydney there is a distinct and increasing reliance on private vehicle transport (as shown in Figure 14 revealing changes in travel modes between 2001 and 2006). It can be argued this trend stems from 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 Sydney's existing passenger rail system.

Figure 14: Changes in Travel to work modes in NSROC region 2001-2006



Source: Australian Bureau of Statistics. 2006 and 2001 Census of Population and Housing (Emunerated)

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

NSROC Traffic Profile

Discussions with each NSROC council showed they rank the current level of traffic congestion high on their list of environmental concerns, and that the problem is progressively worsening across the region.

The NSW State Plan, released in November 2006, provided overarching goals for all state planning, including: healthy and harmonious communities, a high quality public transport system with cycling and pedestrian networks, improving urban environments, stimulating business investments, providing for open space and the arts and increasing the number of dwellings within 30 minutes travel of a Strategic Centre. Specifically Priority E5: Jobs Closer to Home includes the

Target of 'increasing the percentage of the population living within 30 minutes by public transport of a city or major centre in Greater Metropolitan Sydney' (page 124). The data quoted in the State Plan suggests that only 59% of the population of the North West have access to a city or major centre within 30 minutes by public transport. This figure is the lowest in Sydney.

There is general consensus that the Greater Metropolitan Region of Sydney is facing traffic gridlock in the foreseeable future. This stems from extrapolating the association between the rapid growth in private vehicle journeys over the past five years, with proposals for substantial residential growth areas in the outer fringe of the city that are unlikely to be serviced by new rail infrastructure within the next decade.

The NSROC region is facing extreme traffic pressures over the next 30 years, and gridlock at many pressure points well before this time. Looking at Road and Traffic Authoruty (RTA) data the NSROC region has almost half of the most congested traffic thoroughfares in Sydney.

The NSROC region is serviced by five major arterial roads. These are the F3 freeway from the north, the Pacific Highway, Pennant Hills Road, Lane Cove/Ryde Road, and Epping Road / M2 tollway. Anecdotally, peak hours on most of these roads on weekdays already extends from 6.30am to 9.00am, and from 3.30pm to 7.00pm. All these roads 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).

Figure 15: Key road links in Sydney Region

The new M7 tollway has aggravated the existing congestion on Pennant Hills Rd and Epping Rd / M2. Vehicles travelling from Melbourne to Brisbane confront over 20 traffic lights on Pennant Hills Rd before they reach the F3 on their way north. Alternatively, they concentrate on the M2 east of Pennant Hills Rd if they are heading to the city. Longer term, the growth of the North-West sector and its new growth centre, will also cause more cars to feed out onto both the M2 and Pennant Hills Rd. This congestion can be expected to occur unabated unless the proposed rail line to the North – West growth centre is built.

In the longer term, the population of the Central Coast and Hunter Region are also likely to continue increasing, be this strategically directed through State government plans or as a product of market forces. Again, there are no short-term plans to augment the rail system between the three regions, so that passenger cars are likely to remain the transport mode of choice. The Pacific Highway at Wahroonga and Pennant Hills Rd at the F3 termination points will be the immediate recipients of this increasing pressure. The evidence points to an inescapable move towards severe traffic congestion throughout the NSROC region well before 2030, and most likely gridlock during morning and evening peak hours.

The most relevant data available is that collected in the traffic survey undertaken during 2005 by the RTA as part of a three year repeating cycle covering the whole 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.

For the purposes of this exercise, only those roads that recorded a minimum AADT of 70,000 vehicles per day at some point along their monitored length was included, since this figure was considered to represent considerable existing congestion. This showed 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 are shown in Figure 16.

Figure 16: Regional Road Vehicle Counts (based on RTA 2005 data)

NSROC Regional Roads	Vehicle Count 2005
Epping Rd	77,000
F3 freeway at Wahroonga (feeder road)	77,000
James Ruse Drive (feeder road)	72,000
Lane Cove / Ryde Rd	77,000
Military Rd	78,000
Pacific Highway	69,000
Pennant Hill Road	83,000
Victoria Road	87,000

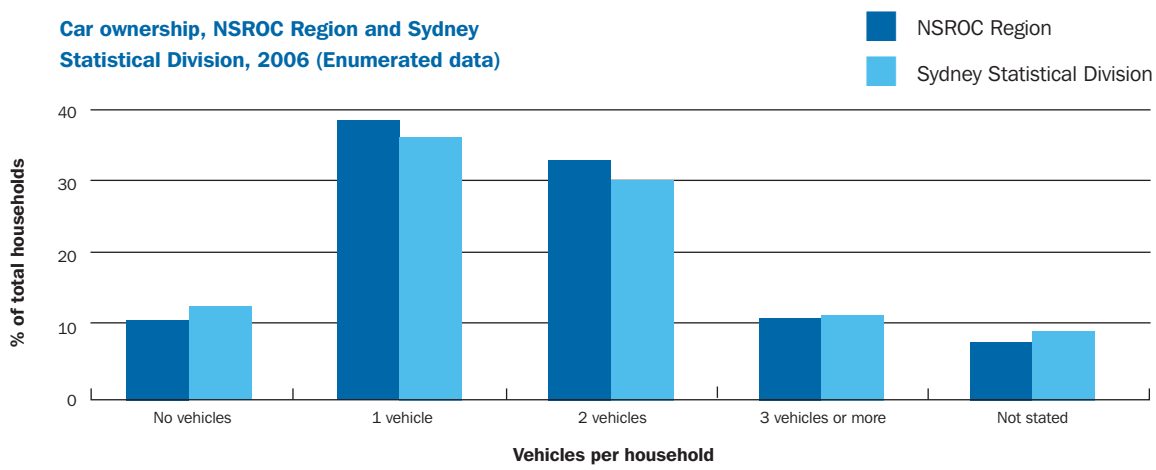
(For comparison purposes, certain roads on the southern side of the Harbour Bridge showed inordinate congestion as well: General Holmes Drive carried 145,000; Southern Cross Drive 128,000, Parramatta Rd 86,000, the Princes Highway 89,000 and the M5 East 98,000).

The figure for the M2 for 2005 was around 38,000 which is around half the number of vehicles recorded on Epping Road. This data suggests the anticipated easing local congestion from the M2 is not being realised and reinforces the view that the region is facing a dismal future from heavy congestion.

There is one LGA that warrants specific attention in this analysis, and that is North Sydney. It sits at the northern confluence of the Sydney Harbour Bridge, the Sydney Harbour Tunnel and the Cahill Expressway. The total AADT recorded for the Bridge and Tunnel was 250,000 vehicles per day, all of which travelled past or through the Council's area. The underlying stress on this part of the road system is demonstrated quickly if a car breaks down on any of these Harbour crossings at morning or evening peaks hours. The jam occurs swiftly and can take hours to clear.

A substantial contribution to congestion in many areas is also made by truck movements through the GMR. These are either smaller units working in the light industrial or commercial sectors and making local trips, or heavy rigid trucks or B-doubles carrying upwards of five tonnes across longer distances. There is an ongoing debate over how Australia will cope with the need to move an increasing freight load around the country, and especially to and from its key shipping ports. Various policy initiatives have been announced at both the Federal and State Government levels that aim to optimise the road-rail freight balance, but there is a growing expectation that cities like Sydney will experience a much greater interaction with heavy vehicles before changes are realised. The most popular estimates are that the number of heavy vehicle movements across Australia will double by 2015. Whilst a substantial portion of this will be cross-country by trucks carrying in excess of 35 tonnes, or by freight trains, almost 70% will involve intra-urban movements.

Figure 17: Car ownership for NSROC residents 2006



Source: Australian Bureau of Statistics. 2006 Census of Population and Housing (Emunerated)

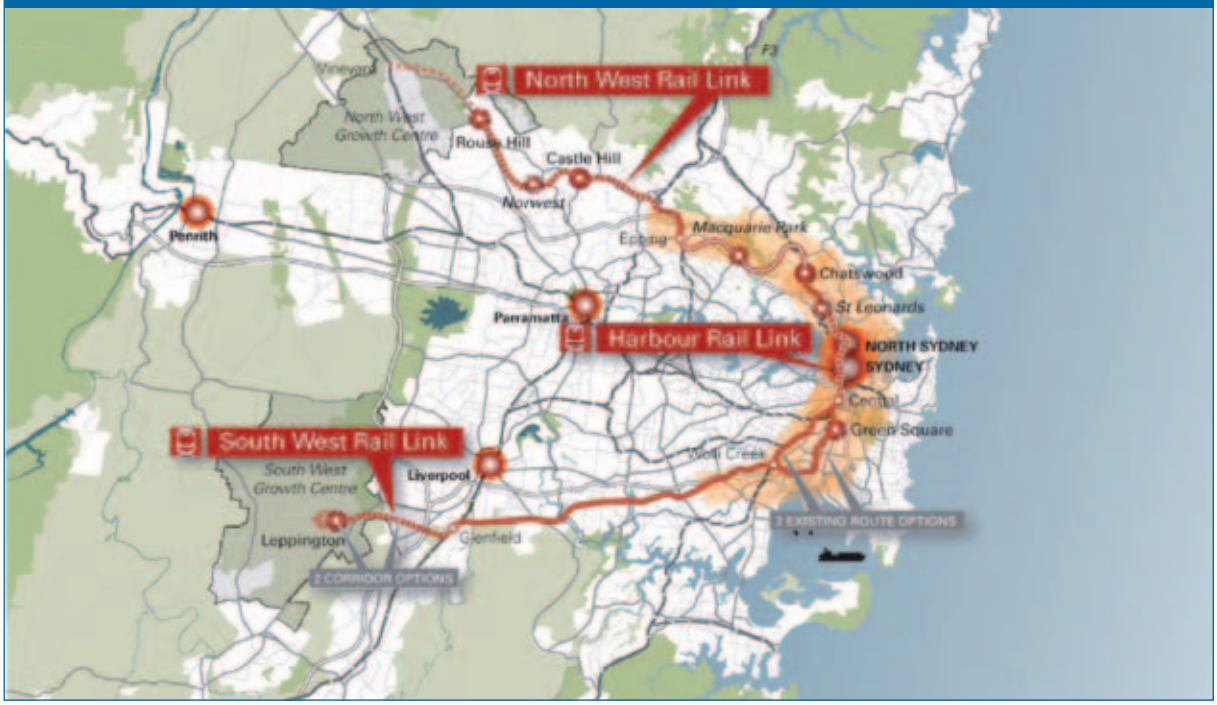
Despite initiatives at all levels of government and higher awareness of the environmental impacts of cars, car ownership levels in Sydney are increasing. The most recent Household Travel Survey 2007 (released by the Department of Transport and Infrastructure in September 2009) shows that from 1999 to 2007 the number of private vehicles in the Sydney region has grown from 2,027,000 to 2,388,000. This increase is twice the rate of Sydney's population growth.

NSROC councils are monitoring car ownership per capita throughout the region. Of specific concern is the relatively high level of car ownership despite access to public transport in many parts of the region and the increase in the number of households electing to have two or more cars. Around 82 per cent of NSROC households have a car and 32 per cent have 2 cars. There are around 160,000 cars in the NSROC region today. Based on additional household targets there will be around 250,000 vehicles in the NSROC region by 2030 .

SUSTAINABLE TRANSPORT MODES

To prevent congestion from becoming an overwhelming environmental issue, the State Government is obligated to plan and deliver adequate mass transport infrastructure to service the growth that councils are expected to provide over the
next 25 years. In keeping with this imperative, a major component of the Metropolitan Strategy was to have been the completion of the north-west rail line to connect the new growth areas in the north west with the rest of the city as

Figure 18: Rail links proposed in 2006 Metro Strategy



CASE STUDY

RYDE AND WILLOUGHBY COUNCILS – Community Bus Services

Two new free community bus services commenced this year, they were the City of Ryde's 'Top Ryder Bus Service' on 22 July 2008 and Willoughby Council's 'Artarmon Loop' on 4 May 2009.

Both services demonstrate Councils commitment to environmental sustainability and encouraging residents, workers and visitors to use public transport, and leave the car at home, especially for local trips.

The Top Ryder Bus is key component of City of Ryde's Integrated Transport and Land Use Strategy (RITLUS) and services the southern part of Ryde to complement other existing public and community bus services. This free bus service connects the West Ryde, Eastwood and Gladesville shopping precincts via the Top Ryde and Meadowbank shopping precincts and Ryde Hospital. Since the service began, over 22,000 passengers have been shuttled between the centres.

The two colourful Top Ryder buses owned by Council run six days per week during business hours, and the buses have been specially adapted to assist the elderly and those who use wheelchairs.

The 'Artarmon Loop' travelling the loop from St Leonards Station through the Artarmon industrial area has similar features to the Top Ryder except that the buses are not owned by Willoughby Council and was introduced to primarily service businesses operating Monday to Fridays between the hours of 6am and 6pm. Passengers numbers for this service are building quickly and numbers will be reported in next years report as the service becomes established.

illustrated below in Figure 18:

While the Lane Cove Tunnel and the Epping to Chatswood Rail-link have been completed, it is extremely concerning that, in early 2009, the NSW Government indefinitely deferred the North-West and South-West Rail-links and supplanted with a new metro train proposal from the CBD to Rozelle.

NSROC believes that suspending the North-West Rail-link will have dire consequences for the sustainability of the region with overwhelming environmental and economic effects. Although northern Sydney has substantial infrastructure for road, rail and some other transport services, this will not be able to serve the region's increased demands because of urban consolidation, sustained competitive economic growth and cross-regional transport (particular western Sydney and Central Coast through traffic) without a long-term plan for maintenance and upgrades.

Meeting the Challenge of Sustainable Transport

NSROC councils have two sustainability challenges – they must attempt to alleviate the negative impacts of a poor transport network as well as develop sympathetic land use planning to accompany future transport corridors (should they be activated).

In July 2007 NSROC had already identified major regional transport infrastructure requirements (*NSROC Sub-Regional Planning Strategy 2006-31*) it sees as necessary to enable further residential consolidation on the scale envisaged in the Metropolitan Strategy without overwhelming environmental and economic effects. These were:

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

While State and Federal governments are primarily responsible for these actions the NSROC councils work closely with transport agencies to ensure opportunities for active transport and public transport are maximised. This includes the reinstatement of the North-West Rail-link, the M2-F3 orbital link, a strategy for the North Sydney-to-Macquarie Park corridor, and consideration of light rail options and an integrated cycle network.

NSROC is also constantly advocating and promoting complementary sustainable transport options for the region. In 2008 NSROC made a regional submission to the NSW Upper House Inquiry into the North-West Rail-link. In October 2009 NSROC also made a submission to the Sydney Morning Herald's Inquiry into Public Transport. Both of these documents highlight the need for sustainable transport solutions to benefit the environment, the society and the economy.

As owners and managers of local roads, Councils are a critical player in public transport planning and management. Councils directly contribute to public transport through local transport infrastructure provision, the development of alternative transport options like bike and pedestrian routes, and as direct providers and subsidisers of community transport which, for the most part, is attempting to fill the gaps in existing public transport.

The NSROC Councils manage public roads and related transport infrastructure valued at over $2 billion and spend over $30 million each year on maintenance. They also provide over $1 million of community transport services to the region.

Councils also play an important role in educating the community on sustainable transport choices, and in developing alternative active transport options such as cycling and walking. Some relevant sustainable transport initiatives are outlined below:

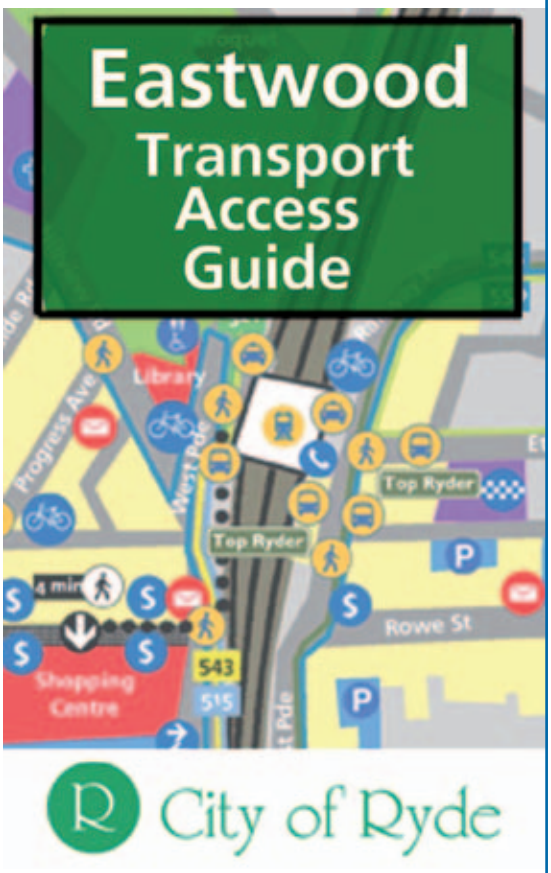
CASE STUDY

RYDE COUNCIL – Pedestrian Mobility Access and Transport Access Guides

As part of its Integrated Transport and Land Use Strategy, the City of Ryde has developed a City wide Transport Access Guide (TAGs) and centre based TAGs for the Eastwood Shopping Centre Macquarie Shopping Centre and Gladesville Shopping Centre.

The City of Ryde is exploring ways of providing customised travel information for people travelling within Ryde areas that utilise low energy transport such as walking cycling and public transport. For employees, customers, residents and visitors to Ryde a TAG can not only provide transport and travel information, including recreational walking and cycling routes but also information about surrounding services and businesses. TAGs have the potential to reduce car travel and associated GG emissions and traffic congestion while encouraging healthy activity.

The Integrated Transport and Land Use Strategy has also seen the development of Pedestrian Mobility Access Plans (PAMPs) for key Ryde Centres. The PAMPs Identify key routes to local attractions, access to public transport, safe walking environments and pedestrian accident areas, vehicle speeds and road crossings. The PAMPS inform the Council's future capital works budgets.



The **City of Ryde** continues to implement actions and recommendations from its Integrated Transport and Land Use Strategy (ITLUS) adopted in 2007. The strategy aims to improve the interconnectivity between the centres, achieving a more sustainable and integrated transport and land-use system. The strategy also aims to reduce car dependency and increase patronage of the public transport system across the City. One recent initiative is the production of Transport Access Guides for the three retail centres of Gladesville, West Ryde and Macquarie Park as well as one city wide LGA TAG (see case study). In addition, Council completed a Pedestrian Access Mobility Plan (PAMP) for the Eastwood centre in 2009. The PAMP was completed to assess the accessibility and safety of the current pedestrian infrastructure and movements within the area. The major development for sustainable transport this year was the opening of the new $2.3 billion Epping to Chatswood rail-link which has three new stations right in the heart of the City of Ryde – Macquarie University, Macquarie Park and North Ryde. The new link provides direct rail access for the first time to the expanding Macquarie Park/North Ryde business, educational and retail hub (see case study).

The North Sydney Train Station upgrade was completed. **North Sydney Council** and the State Government entered an agreement to expedite this project through additional developer contributions. Council has also supported improvements to the pedestrian network through additional walking signage and a second edition of the Walking North Sydney brochure. Construction of the $15 million Falcon Street pedestrian facilities commenced and this is close to completion. Council also received a grant of $50,000 from DECCW to further develop the HarbourLink shared use path project through a cost-benefit analysis.

North Sydney Council has also reviewed the 2004 Bike Plan and developed a new 2009 Bike Strategy which identifies and prioritises bicycle facilities in North Sydney over the next 10-15 years. North Sydney Council continues to expand resident parking. This gives improved access for residents, however it also encourages commuters to consider other alternatives rather than driving to work. In addition a further 6 car share "pods" were installed. Council adopted a recommendation to require green travel plans for large developments which will create employment and car share parking can be installed in new developments in lieu of "standard" parking.

One of the projects aligned to **Ku-ring-gai Council's** draft Town Centres Development Control Plan is the draft Ku-ring-gai Town Centres Parking Management Plan (PMP). The PMP sets out parking strategies in each of the 6 town centres to manage future demand and growth, and includes specific focus on access to public transport and parking for alternative modes of transport. For example, the PMP supports the draft Town Centres Development Control Plan's proposed lower parking provision in centres with good access to public transport, which would support the role of public transport and therefore reduce congestion and emissions. Also, the PMP is working towards strategies where buses, pedestrians and bicycles have priority over private vehicles in terms of commuter access and proximity of parking to rail station entrances. It is proposed that dedicated motorcycle/scooter parking be incorporated in future Council-owned public parking areas, and that development sites consider allocating spaces to motorcycle/scooter parking. To encourage the use of car sharing schemes, dedicated on-site car share parking would be supported, and dedicated on-street car share parking spaces may be considered in the Gordon Town Centre. Residents, employees and visitors to the town centres would therefore be encouraged to consider alternative forms of transport as their means of travel to or from the centre.

Hornsby Shire Council undertook a Sustainable Fleet Management Study in 2007 and is currently in the process of implementing the recommendations from the study. Some of the key actions currently being implemented include:

- at vehicle changeover, all 6 cylinder "business use only" vehicles are to be replaced with the most appropriate fuel efficient vehicle;
- all new entrants to council's motor vehicle private use scheme will be provided with a choice of 4 cylinder vehicles only, the choice of which has broadened significantly;
- all existing employees who have a 6 cylinder vehicle are encouraged to move to a four cylinder vehicle where practicable;

CASE STUDY

NORTH SYDNEY COUNCIL – Bike Smart North Sydney workshop

North Sydney Council ran a free community bicycle workshop, Bike Smart North Sydney, in February 2009 in response to an increasing interest and participation in cycling to and from work. Workshop participants felt they had lacked confidence and wanted to know how to access city cycle-ways, how best to commute by bike, basic bike maintenance, and meet other cyclists.

North Sydney Council teamed up with the community based Bicycle User Group, Bike North, and local bike shop Cranks Bike Store to deliver a very successful workshop.

Designed to be practical, workshop participants learned from Bike North about finding their way round North Sydney area by bike, bikes and public transport, safe riding tips and basic bike maintenance. Workshop participants enjoyed the informal presentation style which enabled good question and answer time and hands-on bike maintenance demonstrations by Cranks Bike Store. All participants found the workshop very useful and a number have now taken up or increased cycling.

The Bike Smart North Sydney workshop formed part of an ongoing Sustainable Living Workshop series offered to the North Sydney community to deal with issues of sustainability within the fields of climate change, water and energy efficiency, waste reduction and sustainable transport. The free workshops are offered on weekends and weeknights and are presented in a practical and interactive way to encourage resident participation, strengthen community capacity to live sustainably and link to other North Sydney Council sustainability education, retrofit and behavioural change initiatives.

- council will undertake the testing of a representative sample of fleet vehicles to determine emissions performance on an annual basis;
- council will investigate mechanisms by which staff are able to purchase annual train tickets in a tax advantageous manner and improving the economic and environmental performance of the fleet.

Willoughby City Council continued to implement a number of sustainable transport initiatives in 2008/2009. The new Artarmon Loop shuttle bus was introduced in May to service businesses in the Artarmon industrial area, while the CouncilCab service continued to be popular with residents and Council took over the management of the booking system. Residents were encouraged to get back on their bikes through participation in Council's cycling skills and bicycle maintenance workshops, National Ride to Work Day, and a number of free activities during NSW Bike Week. Additional bike paths and racks were installed across the Council area to increase access to cycling facilities. Willoughby City Council continued to encourage its own staff to cycle more frequently by offering cycling skills workshops to employees and expanding the staff bicycle fleet.

In addition to an update of the bicycle map, a new walking in Willoughby map was developed. This was produced in conjunction with a signposting project to highlight the many walking links in the local area. Council staff also worked with local schools to encourage walking, cycling and using public transport. Council supported Walk Safely to School Day by hosting a healthy breakfast and providing incentives to students in local schools. A sustainable travel competition was also run with a local primary school with very successful results.

Hunter's Hill Council is seeking to implement its adopted bike plan to provide a combination of on and off road routes for recreational and commuting needs. It is anticipated that grant funding will be obtained and continue the installation of various facilities. Council staff have voluntarily addressed vehicular emissions by switching to four cylinder petrol and diesel engine cars. About half of council's car fleet has been changed to these low emission vehicles.

Lane Cove Council has approved its final bicycle plan. The main objectives of the plan are to make cycling safer, easier and more attractive in the Lane Cove LGA, and to allow for greater connectivity with surrounding bicycle paths. The plan will cater for all types of cyclists and trip types, including students, commuter and recreational cyclists, as well as others wanting to use cycling infrastructure, including walkers and joggers. The Bicycle plan includes approximately $4million of infrastructure bicycle works for the Lane Cove Area. Council is also participating in the regional Sydney bicycle plan.

Lane Cove Council celebrated National Walk Safely to School Day with a breakfast for parents, carers and their children to walk to school safely. Over 600 people registered for the event and even more turned up on the day! There were goody bags, a toss the footy game, Ku-ring-gai Highway Patrol with their motorbikes, and finally dancing and exercises. During the morning we had special guests including Bicycle NSW, Life Education (with Happy Healthy Harold) and NSW Health. Breakfast and prizes were donated by local businesses. The event was held to educate students on road safety messages.

WASTE MANAGEMENT

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

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

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

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

Solid Waste Disposal and Recycling

In 2008-09 residents of the NSROC region generated 102,761 tonnes of material which went to landfill. Another 128,587 tonnes of material was recovered through recycling systems and an additional average of 100 kilos of green waste was recycled for each person in the region. In total, more waste was collected in 2008-09 than in previous years, reflecting the region's growing population.

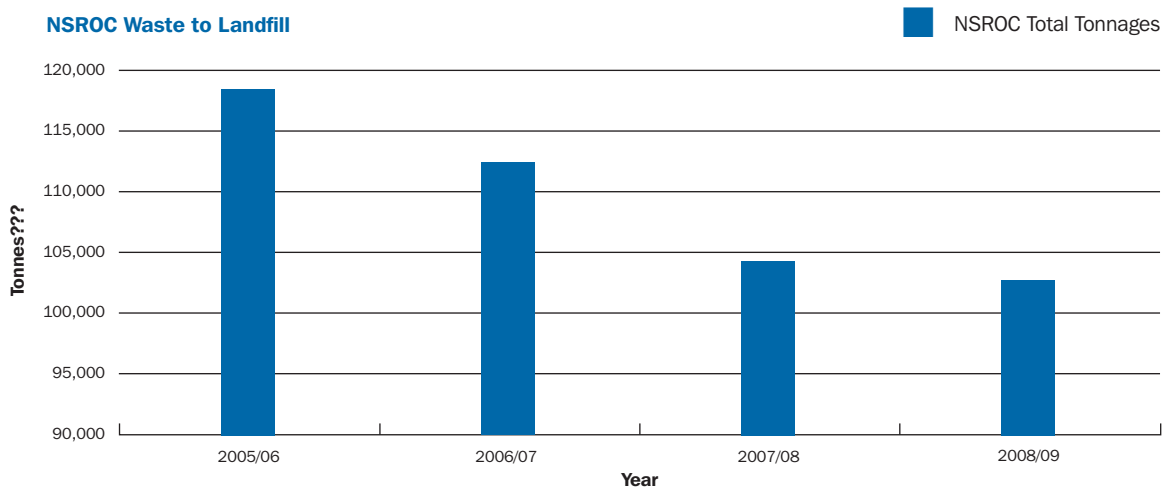
Figure 19: Landfill and recycled waste by councils within the NSROC region in 2008-09

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 a year (kgs)
North Sydney	4096	9850	65	157	19
Lane Cove	7223	5864	228	185	60
Hunter's Hill	2188	1481	170	116	24
Ryde	23,406	21,528	227	117	91
Ku-ring-gai	21,500	33,396	199	309	167
Hornsby Shire	33,020	37,749	205	124	111
Willoughby	11,328	18,719	167	275	89
NSROC	102761	128587	181	176	80

Total greenhouse gas emissions saved in NSROC region resulting from recycling (using the DECCW environmental calculator) 64,569 TONNES OF CO2

While some individual measures varied between Councils from the previous years a strong downward trend is visible across the NSROC region as a whole with declines in waste to landfill.

Figure 20: NSROC Trends in landfill diversion 2005-2009



Responding to Waste Issues

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

Hunter's Hill Council is in the process of replacing its open topped street and park bins. The old style bins create problems and water saturation and bird generated rubbish being strewn around the bins. It is intended to convert these bins to sealed mobile style bins to be collected as part of the normal waste collection. This will allow an increase in the percentage of waste being collected and recycled as well as greatly improving the visual amenity of the locality.

During the past year **North Sydney Council** engaged a consultant to undertake an audit of 260 garbage containers situated within multi-unit and single unit dwellings. The purpose of the audit was to determine what material was still present in the garbage containers and what potential existed to recover more waste. In October, NSC commenced a trial of 300 households over a three month period to seek residents opinions on using Mobile Garbage Bins (MGB) of varying capacity and frequency of service. As a result of the trial and a preference by residents to use MGB's, NSC will be including the provision of an MGB as an option when calling for tenders for the new Waste and Recycling Services Contract to begin in 2010. NSC conducted a collection of E-Waste during the month of March which resulted in twelve tonnes of unwanted electrical products and equipment being diverted from landfill and sent to a recovery facility. During November NSC promoted Recycling Week through the media, local precincts and static displays. In April, NSC conducted workshops for primary school students on how to compost.

Hornsby Council In 2008/09 46% of the material collected from the domestic waste collection service was sent to landfill, this is similar to the results for 2007/08. There have been a number of minor changes that could have affected this result including a small growth in population and a general trend that indicates that waste generation per household has increased since the previous year. Until additional waste treatment technologies and facilities are available it is unlikely that further significant increases will be achieved past this point.

Through use of the Bin Crew Hornsby Shire Council has been encouraging its residents to reduce the amount of waste they send to landfill through the following strategies; continuing with two electronic waste and chemical collections per year, increased publication of the waste events education program for workshops on composting, green cleaning and recycling tours, running an annual clothing exchange and running wood chipping days.

In response to DECCW's Performance criteria for local government waste management, **Ku-ring-gai Council** has changed the lid colour of all residential paper bins, to comply with the Australian standard from yellow to blue. To be eligible for recycling rebates from NSW Government Council needed to comply. This process was completed in July 09. The old yellow lids were taken back for recycling.

Community E waste collections have been carried out over the last two years in Ku-ring-gai and funded by the computer industry, costing the Ku-ring-gai community very little. Council is awaiting the Federal Governments decision in November 2009 before any more collections are planned, as it is not known what form the national computer recycling program will take.

A total of 44, 972 Kg of chemical waste was diverted from landfill at the annual chemical collection in November 2008. Due to the resident demand this service will be offered over two consecutive days in 2009 instead of the previous single day collection.

Ku-ring-gai Council's mobile phone recycling program has been in operation for over 2 years, with the Spastic Centre receiving a donation of between $3 and $5 for every phone handed in for recycling at Council. Ku-ring-gai is currently investigating a new community sharps drop off program to assist residents in the safe disposal of residential sharps.

City of Ryde has continued to deliver numerous waste education programs for its residents which include free on-site chipping and mulching, second-hand Saturday events, e-waste collections, recycling of mobile phones, composting and worm farming workshops. Council also installed 42 new stainless steel 'Butt Out' cigarette bins in high use locations and provided a free drop-off point for light globes to ensure that dangerous mercury is properly collected and recycled. The 2009 Waste-to-Art competition for local schools was also a great success in educating students on the importance of recycling.

Lane Cove Council organised free Compost and Worm Farming workshops to the residents of Lane Cove. Each participating resident received a choice between a worm farm and compost bin free of charge. The residents were given hands on experience on how to create and maintain their compost bins and worm farms and in turn encourage them to build a sustainable organic garden and using the compost from the vegetation and food scraps from their homes. A total of 65 Worm Farms and Compost bins were distributed among the residents during the workshops.

Willoughby City Council has raised awareness of general waste issues and the importance of reducing waste produced at source through the promotion of home composting and worm farming via regular free workshops (four free workshops conducted per year) and the subsidised sale of compost bins and worm farms.

Council has increased community awareness of the destination of kerbside collection of household waste, recycling and green waste, through site tours of the Eastern Creek landfill site and Alternative Waste Technology Facility (UR-3R), the Materials Recycling Facility at Chullora and Kimbriki Waste and Recycling Centre (six free tours conducted per year). Information has also been disseminated about the problems of hazardous waste and alternative disposal arrangements for items such as batteries, mobile phones, compact fluorescent light globes and e.waste.

Willoughby City Council has encouraged an interest in knowledge of waste issues with children through school-based activities such as recycling relays, waste audits, Rubbish Free Lunch Challenges and composting and worm farming workshops.

CASE STUDY

RYDE COUNCIL – City Of Ryde's New Public Place Recycling Program

New Waste & Recycling Bins have been installed in Eastwood shopping centre and will also be rolled out in other City of Ryde shopping precincts and premium parks. The main aims of the project are to divert more recyclable materials from landfill, reduce littering and dumping in public areas and encourage a public mindset thoughtful of recycling and minimising waste.

The waste and recycling stations, including rubbish and recycling signage, were designed by Council's own waste team with clear labelling in mind and with the aim of reducing the potential for contamination. The red – rubbish, yellow – recycling signage theme has been kept consistent with the park recycling stations and the domestic service throughout the City in an effort to ensure understanding and compliance.

To encourage recycling in Eastwood shopping centre and eliminate illegal dumping, a comprehensive education plan was developed to compliment the rollout of the new bins. An integral part of the plan was the development and distribution of the "information about the waste and recycling bin stations" pamphlet to shop owners within the Eastwood shopping centre.

The pamphlet details in English, traditional Chinese and Korean how shoppers can dispose of their bottles, cans, newspapers and other recyclable items in an environmentally friendly manner whilst shopping, instead of being mixed with rubbish and going to landfill. Interpreter service information is also available for other community languages on the back of the pamphlet. In addition, a 'Place Manager' will be on duty in key roll-out areas.

NOISE

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

Noise Complaints

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

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

Responding to Noise Complaints

Councils play a major role in addressing noise complaints through the actions of environmental health officers and rangers who can take action under various government acts and council regulations. This role is shared with the DECCW, the police, the NSW Maritime Authority and the RTA.

There are various ways to mitigate urban noise. Techniques such as the use of sensitive building designs and noise barriers can be particularly helpful, but certain features of the natural environment can also help. Topographical

Figure 21: Noise complaints received by Council within the NSROC region in 2008-09										
Council	**Barking dogs**	**A/C**	**Building sites/ construction**	**Licensed premises**	**Garbage trucks**	**House & car alarms**	**Domestic noise source**	**Aircraft noise**	**Other**	**Total**
North Sydney	64	N/A	45	NA	NA	NA	NA	NA	170	279
Lane Cove	51	9	4	13	5	7	21	1	16	127
Hunter's Hill	8	12	12	0	2	0	12	1747	0	1793
Ryde	131	10	32	4	6	8	15	56	38	300
Ku-ring-gai	259	23	21	0	NA	NA	NA	NA	159	462
Hornsby Shire	391	17	74	13	17	5	70	39	80	706
Willoughby	120	17	18	11	13	10	24	1	18	232
NSROC	1024	88	206	41	43	30	142	1844	481	3899

separation between the source and the recipient – such as a hill - can be very effective, as can suitable vegetation cover. Urban intensification can remove buffers provided by beneficial natural assets and introduce features that amplify sounds.

Sensible site planning, building layouts and the use of noise-reducing insulation when approving developments can all improve noise suppression and management. Similarly, in long-term infrastructure planning, the nomination of transport corridors for traffic management can take account the effects on residents within the impact zone; and noise barriers can be installed at the most vulnerable locations.

Hornsby Shire Council has reviewed its conditions of consent and procedure relating to construction noise in close proximity to potentially affected receivers (e.g. residential dwellings). Council now requires a noise management plan indicating how the developer will achieve acceptable noise levels for the course of the project. This may include implementing temporary acoustic barriers, controlling timing of large noise events, notification of affected residents and submission of taken noise readings to the Certifier and Council for analysis. The Department of Environment, Climate Change and Water's *Construction Noise Guideline* has been utilised in the development of the above procedure and relevant conditions.

To address noise associated with barking dogs, Hornsby Shire Council has implemented a staged approach. When the initial complaint is received, Council officers will usually suggest ways to help the dog owner quieten the dog (e.g. obedience training, keep the dog inside at the usual times of nuisance, covering visual triggers (if they bark at movement), or suggest barking collars). Should subsequent complaints be received, Council officers request that a diary be completed by the complainant and Council will undertake patrols of the residence at the times of offence. If necessary, Council will issue a Nuisance Order to the dog owner.

The NSROC area is also affected by aircraft noise and complaints on this issue are relatively high. If this pattern continues, aircraft noise could become a more prominent environment issue in future. It should be noted that in the aircraft noise data provided below the number of complainants was significantly lower than the number of complaints. For a further breakdown of aircraft noise complaints see Appendix 2.

Figure 22: Aircraft Complaints Top Ten NSROC Suburbs 2008-2009		
NSROC Suburb	**Complaints**	**Complainants**
Hunter's Hill	1736	41
Lane Cove	64	23
North Ryde	32	19
East Ryde	25	15
Pymble	21	5
Roseville	21	6
Riverview	13	2
Chatswood West	10	1
Gladesville	8	8
Turramurra	8	6

ENERGY CONSUMPTION

Energy use is an integral part of human settlement. We consume energy in our houses, workplaces, streets, and any other areas in which humans have settled. Energy use produces a significant amount of Australia's greenhouse gas emissions. Most of our energy is produced through burning non-renewable fossil fuels, such as coal, which creates significant amounts of greenhouse gases. Although renewable sources of electricity are being implemented through hydro, wind and solar technologies, these sources still only provide a fraction of all energy consumed today.

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

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

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

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

CASE STUDY

HORNSBY SHIRE COUNCIL – Renewable Energy at the Old Tollgate Site, Berowra

Two forms of renewable energy generators have been installed at the new Emergency Fire Control Centre, located at the old Tollgate Site along Pacific Highway at Berowra. This action was undertaken in accordance with the objectives of Hornsby Shire Council's *Sustainable Energy Policy for New Council Assets*, which requires all new projects to have an average annual greenhouse gas emission at least 30% below that of an existing equivalent facility and "*optimise opportunities to…incorporate renewable energy technologies wherever possible*".

A wind turbine and a solar photovoltaic (PV) system have been installed to power the new centre. The wind turbine has been sized to produce approximately 30% of the estimated power consumption (approximately 27,000 kWh per year) of the new Fire Control Centre, based on the consumption of the old Fire Control Facility located in Hornsby Heights. The PV system is there to supplement the power output during times of low wind speed.

The site is considered suitable for a wind turbine as it has open terrain, is often windy and is away from residential buildings. The Proven Energy 15 kilowatt wind turbine has a 3 bladed, 9 metre diameter rotor mounted upon a 25 metre galvanised steel, monopole tower and is connected to the national electricity grid. The position of the turbine is approximately 150 metres south of the Fire Control Centre.

To ensure that adequate power is delivered to the Fire Control Centre during low wind periods, an auxiliary 3 kW photovoltaic (PV) system installed on the roof of the new building will deliver approximately 4,020 kWh per year. The wind turbine and PV system together will generate approximately 31,000 kWh per year, which would be enough to power 4 average households, and will save 33 tonnes of greenhouse gas per year.

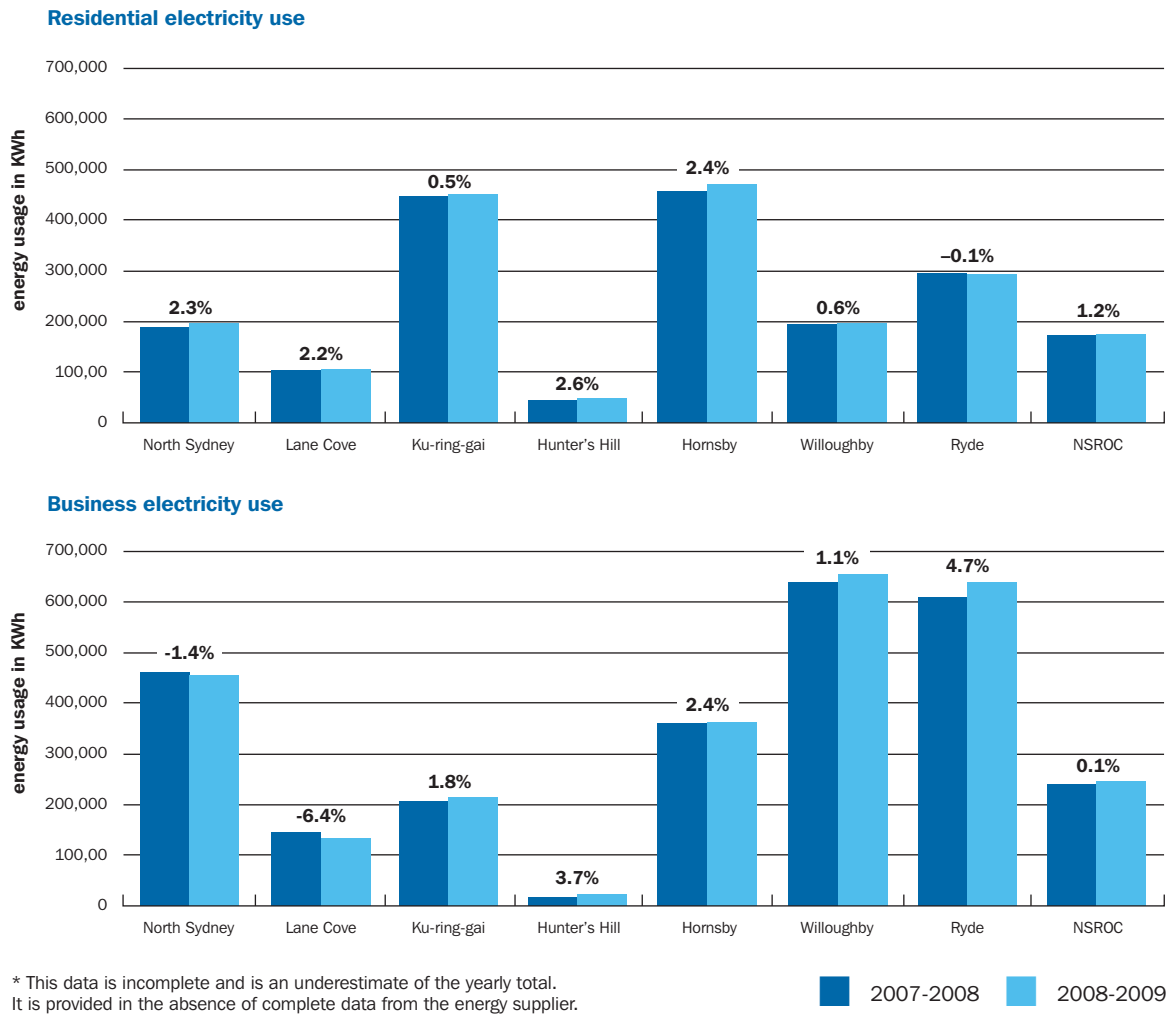
Council has worked closely with the NSW Rural Fire Service to bring this project to fruition.

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

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

The 2008/09 figures show that while residential consumption has risen, commercial use has stayed virtually level with some councils achieving substantial reductions.

Figure 23: Energy consumption of Energy Australia customers within the NSROC region in 2008-09



Responding to Energy Demand and Consumption

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

Ku-ring-gai Council has recognised there are many opportunities to reduce residential energy consumption. One program has been the fridge buyback scheme (a grant funded program developed by Next Energy), where residents can have any second working fridge removed and recycled, reducing their energy consumption and reducing CO2 emissions. The program has removed 702 working fridges from Ku-ring-gai homes, reducing total greenhouse emissions 5917 CO2 tonnes and saving residents a total of $1,000,000 in energy costs.

CASE STUDY

HORNSBY SHIRE COUNCIL – Clothing Exchange

With the aim of promoting the reuse of items such as clothing and to encourage residents to re-think unnecessary consumerism, clothing exchange events in 2008 and 2009 have proved to be a success. Participants are invited to bring along up to 6 new or lightly used clothing items to clothing exchange events. For each item accepted, participants received one token to swap for any other item at the event. All clothing exchange events have been undertaken in partnership with Anglicare and in 2008, local fashion designer, Bethany Joy Monsted.

Nibbles and drinks are offered when guests arrive and a warm, relaxed atmosphere is created with the help of calming music and decorations. Guests are encouraged to complete activities that promote reusing their clothing and other items. The exchange itself is usually held for a period of approximately 2 hours and when checking out, guests are asked to fill out a brief survey.

At the most recent exchange event, in April 2009, out of the 139 surveys completed, 135 guests indicated they enjoyed the Clothing Exchange. The majority of residents, nearly 80%, had not attended the previous

Clothing Exchange in November 2008. When asking about the main message guests were taking home, many indicated they were taking home reuse tips (29%) and positive messages about recycling (59%). These are significant responses and it seemed as though the reuse message got across to most guests. Also encouraging is that 97% of guests indicated they would share these recycling and reuse messages with family, friends and neighbours.

Clothing Exchanges thus far been very successful in meeting their aims. The next Council run exchange event is planned for November 2009.

Hornsby Shire Council has a community greenhouse emission reduction target of 5% by the year 2010. It has achieved a reduction of 3.2% at the end of the 2009 financial year through the implementation of a variety of programs including:

- the Business Energy Savings Program which aids businesses in implementing energy saving measures within their business operations;
- waste reduction programs such as mulch chipping days, workshops on composting and recycling tours; and
- earthwise@home – offering workshops (in partnership with ACF's GreenHome Program) on energy saving, promoting government rebates for insulation and solar hot water and also GreenPower.

Hunter's Hill Council has been one of the Councils in the Climate Clever Shop project with neighbouring Councils to assist community members attain the best possible prices on energy saving domestic facilities. Council also continued its support for the fridge buyback scheme. Approximately half of Council's passenger car fleet has been changed to four cylinder petrol and diesel engines. Council has also reviewed and commenced a replacement program for air-conditioning units in community buildings, so that energy usage is minimised for cooling and heating. Council continues to strive for minimising electricity usage through the Street Light Improvement Program with a number of other Councils.

North Sydney Council continues to address greenhouse gas emissions from Council operations through a range of initiatives including the installation of energy efficiency and renewable energy initiatives, the purchase of GreenPower, waste recycling and use of fuel efficient and hybrid vehicles.

Photovoltaic Panels have been installed at the Stanton Library. Solar hot water systems have been installed at North Sydney Community Centre and Council Chambers. Passive solar design, heat pump hot water systems, energy efficient lighting, lighting timer sensors and improvements to air conditioning systems have also been implemented at a number of sites. The Council Chambers is rated 4 stars (out of a possible 5) under the Australian Building Greenhouse Rating Scheme and is the only local government building rated amongst the top ten green buildings in Sydney.

City of Ryde finalised the implementation of its Energy Savings Action Plan in 2008-09. A range of activities were implemented to complete the plan and this included a significant amount of lighting retrofitting and the installation of voltage controllers and sensor lighting in Council owned buildings and parks. In 2009 Council adopted a policy to limit the purchasing of appliances for Council owned buildings to products with an energy and water star rating as five stars and over. Per year this initiative alone will save 10.6 tonnes of CO2. City of Ryde continues to educate the community and its staff on energy efficiency. The City of Ryde runs ongoing energy efficiency and sustainable design workshops throughout the community in various locations and in 2009 celebrated Earth Hour by an internal office energy efficiency audit. The audit focused on addressing staff office equipment that may be left on after office hours and was complemented by a staff education program on energy and water efficiency. City of Ryde was also a finalist for its Water and Energy Saving Initiatives through the Local Government and Shires Association (LGSA) Excellence in Environment Awards. This award recognised outstanding initiatives undertaken that had resulted in significant savings in energy and/or water within the community.

Lane Cove Council has continued to support the Fridge Buyback program, encouraging residents to hand in old second fridges. 79 fridges were collected from the Lane Cove area in 2008/09, the third-highest collection rate on a per capita basis. An estimated 632 tonnes of greenhouse gas emissions were abated. Lane Cove Council continues to encourage residents to purchase GreenPower, leading by example at high-profile events such as the annual lighting of the Lane Cove Christmas Tree and the Cameraygal Festival.

Willoughby City Council has invested heavily in demand management throughout the 2008/2009 financial year. Additional programs have been put in place to monitor consumption and strategically implement energy conservation, efficiency, alternative power and offset programs. Examples of projects include the installation of voltage conditioning on some of Council's major buildings, installation of a large scale photovoltaic system on the new Council depot building, lighting retrofits, solar hot water, solar lighting and developing a hybrid fleet.

In addition to measures taken by Willoughby City Council to reduce organisational energy consumption, the residents of Willoughby have been encouraged to participate in a range of opportunities as part of the new *ClimateClever* campaign, with the aim of helping residents reduce their own energy consumption, save money and the environment.

These opportunities include comprehensive home assessments, workshops, newsletters and an interactive ClimateClever display house used at public events.

CASE STUDY

LANE COVE COUNCIL – Installation of the Ark in Lane Cove Council Administration Centre

In 2008, Lane Cove Council installed an energy saving device known as 'The Ark' on its light and power circuit, becoming the first council in Australia to do so. After achieving reductions above those estimated, the council installed a second Ark on its mechanical services circuit.

The Ark is able to manage the building electricity supply by reducing the voltage, filtering harmonics, correcting power factor and balancing phases. Unlike similar devices which do some or all of these things, the Ark does them with very small internal losses (less than 1%).

The council considered other options, such as remodeling the building, replacing the air-conditioning and rewiring the building, but all of these would have been very disruptive to both staff and the local community. The Ark on the other hand, was installed overnight.

The Ark provides a great return on investment for Lane Cove Council. With the price of electricity set to rise in future years, the return on investment will continue to grow.

WATER CONSUMPTION

Water consumption is being increasingly identified as critical in Australia, and this also holds true for the northern Sydney region. Like the rest of Sydney, the region has been affected by the recent drought and water restrictions. Sydney's water resources are under pressure from increasing demand for, and consumption of, town water supplies. Population growth, lifestyle changes and the uncertainty of future climate change make the extent of these pressures difficult to measure. The issue of water resources has become particularly important as Sydney is experiencing a prolonged drought and water reserves are extremely low. Although it is difficult to determine the exact nature of on-going climate change, there is a possibility that historical rainfall patterns will not be repeated and Sydney will face more prolonged periods of dry weather with lower annual rainfall.

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

Water Consumption in the Region

Current rates of average yearly water consumption per property vary throughout the NSROC region. Some have been consistently below Sydney's average in recent years, while others have been significantly above average. The northern Sydney region consumed around 52 million kilolitres of water in 2008-09 (an increase of about 2 million kilolitres compared with 2007-08). Freestanding houses remain the highest water consuming building type.

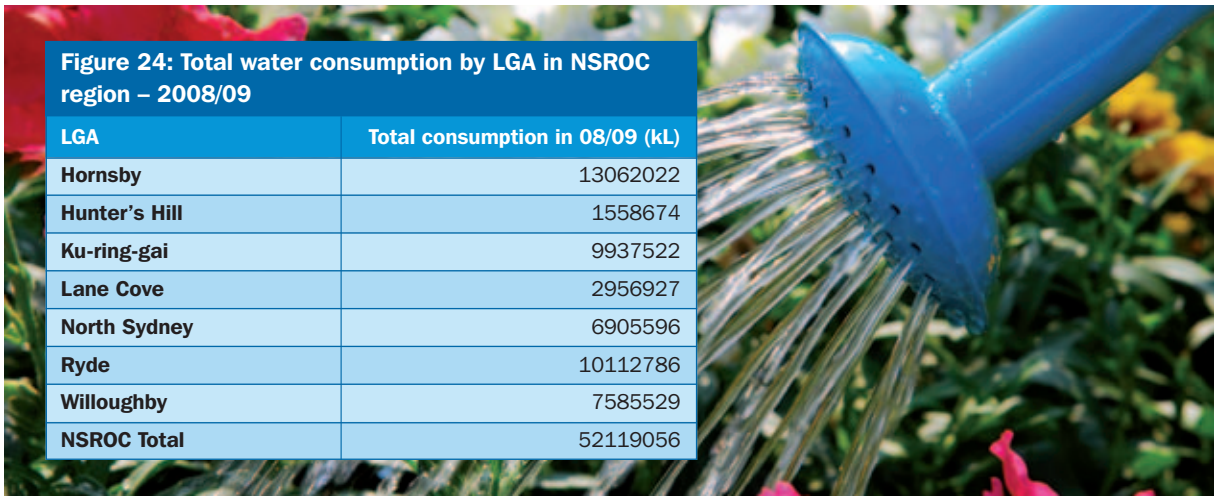


Figure 24: Total water consumption by LGA in NSROC region – 2008/09

LGA	Total consumption in 08/09 (kL)
Hornsby	13062022
Hunter's Hill	1558674
Ku-ring-gai	9937522
Lane Cove	2956927
North Sydney	6905596
Ryde	10112786
Willoughby	7585529
NSROC Total	52119056

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

Figure 25: Water Consumption across the NSROC region by building type – 2008/09

Council	Hornsby	Ryde	Hunter's Hill	Ku-ring-gai	Lane Cove	North Sydney	Willoughby
Commercial	1321298	1499905	99046	654282	277459	1459406	1305205
Houses	8520135	4671168	836579	7743626	1461264	1179590	3138797
Industrial	332187	545625	890	9204	169242	25154	487978
Other	734454	625522	355407	665931	160407	317361	178251
Units/Flats	2153948	2770566	266752	864479	888555	3924085	2475298
Total	13062022	10112786	1558674	9937522	2956927	6905596	7585529

Consumption Kltrs for the year to June 30, 2009 – Sydney Water

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

Hornsby Shire Council's Water Conservation Policy would not be effective without community support. To this end, the Policy sets a goal for a community reduction of 18% by 2011 against the average of community water use over the years 1999 to 2001. The water education programs for the Hornsby community are making progress. Total water consumption in the Hornsby LGA (units, flats and houses combined) was reduced from 12,600 ML in 1998-99 to 10,311 ML in 2007-08 despite a population increase. On the whole, the community has made a substantial effort to reduce their water consumption.

Hornsby Shire Council's corporate target is to achieve a 21% water consumption reduction by 2011 against the average of Council's water use over the years 1999 to 2001. Council's corporate water consumption for 2007-2008 (152,838 kLs) was a significant decrease on the previous financial year 2006-07 (200,508 kLs). Council is awaiting water consumption data on the Hornsby LGA from Sydney Water.

Meeting the Water Challenge

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

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

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

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

North Sydney Council continues to decrease its water consumption annually. Water reuse initiatives and water saving devices have been used to assist in reducing potable water consumption.

A stormwater re-use scheme has been implemented for St Leonards Park, North Sydney Oval and Cammeray Golf Course. Rainwater tanks have been installed at Crows Nest Community Centre, Cammeray Sportsfield Change Rooms, North Sydney Community Centre and at Council's two depots. Water saving taps, showerheads, dual flush toilets and waterless urinals have been installed at a number of sites.

City of Ryde implemented 100% of its Water Savings Action Plan in 2008-09, achieving major reductions in water throughout the organisation. Implementation actions included the installation of a grant funded rainwater tank at the Ryde Aquatic Leisure Centre to collect 220,000 litres and supply water to the balance tanks of the pools. The rainwater tank was funded through a grant received from the DECWW and also included the installation of a water usage monitoring system. Council continues to increase the efficiency of park irrigation systems through irrigation system audits and implementing recommendations from these audits. In addition, in partnership with Sydney Water several real-time monitoring systems have been installed in local parks providing Council with minute to minute water metering data in an effort to prevent long term leaks from going un-noticed.

Hunter's Hill Council is committed to sustainable urban water management within the Council area in 2008 through its membership of the ICLEI water campaign, an international fresh water management scheme. The Council has compiled an inventory of water consumption data and water quality issues influenced by its own and its community's activities. The data will assist with the development of a program of actions to achieve sustainable urban water design. The council has completed water saving installations at the Town Hall and works depot. A major stormwater filtration, collection and re-use project has been completed at the Hunter's Hill Sailing Club building. This work was associated with the redevelopment of the carpark and Sydney Harbour Federation Trust land and included several water sensitive urban development techniques.

Ku-ring-gai Council is continuing to implement projects aimed at reducing potable water consumption. In the 2008-09 financial year, Council completed three stormwater harvesting systems that will allow reuse of stormwater for irrigation of sports fields. These are located at Comenarra playing field, Turramurra, Lindfield Soldiers Memorial Park, Lindfield and at Cliff Oval, Wahroonga. These systems have a combined storage capacity of close to 900kL and have the potential to reuse up to 15ML of stormwater for irrigation per year. Construction of a stormwater reuse project at Roseville Chase Oval, developed in cooperation with the Roseville Golf Club, was also commenced in 2008-09, and expected to be

completed in 2009-10. Initial design work was also commenced for a proposed sewer mining system at the North Turramurra golf course to be constructed as part of the development of North Turramurra Recreational Area.

Lane Cove Council, in partnership with the Department of Water and Energy, promoted Council's water saving initiatives to the public through a social marketing campaign as part of the *Water For Life* initiative. Council received funding to place advertisements in the local paper and produce a large banner for the Lane Cove Aquatic Centre. In November 2008, Council held a Water Savings Expo with a number of rainwater tank and greywater system suppliers participating.

Lane Cove Council offers residents a rebate of up to $550 to install a rainwater tank on their property. The rebate is structured to encourage residents to connect the tank to a toilet and/or washing machine. 28 residents successfully applied for this rebate in 2008/09. Council continues to save water in our own public facilities, implementing actions from the Water Savings Action Plan. In 2008/09 a 350 000 litre rainwater tank and irrigation system was installed at Blackman Park, Council's largest open space.

Willoughby City Council has undertaken a number of water conservation projects throughout the 2008/2009 financial year. Most notably, Council's new Civic Place which is currently under construction includes a 5,000m^3 detention tank. The tank has been designed to capture, clean and reuse water from a 19 hectare catchment in the north west area of the Chatswood CBD. The treated water will be used extensively throughout Civic Place including in the cooling towers, bathroom facilities as well as subsoil irrigation in the landscaped garden area. Excess water will be sent to neighbouring sites for use in their facilities.

Other projects include rainwater tank installation at Northbridge Library, Willoughby House and the Willoughby Leisure Centre for roof water reuse. The Rotary Athletic Park storage system was also built, storing and reusing treated water from the Lane Cove Tunnel.

Hornsby Shire Council has implemented a number of water saving projects including:

- Greenway Park *Stormwater Harvesting Project* – harvested water is used to irrigate two sports ovals. This is expected to reduce annual water consumption of mains water by 13 to 19 mega litres.
- Obtained a $2.4 Million Federal Government funding under the *Regional and Local Community Infrastructure Program* for the Epping Stormwater Re-use and Energy Efficiency Project – recycling of stormwater at three major public ovals located at Epping and Eastwood and installation of energy efficient measures at 4 ovals.
- Organised a Council-wide attendance at the *Sydney Water Speakers Program*.
- Entered a Memorandum of Understanding in August 2008 between Council and Sydney Water for the permanent monitoring of the top 10 water usage sites to understand water usage patterns and maintain low leakage across the Shire.
- Compiled an Analysis of Potable Water Consumption for the Hornsby LGA for 1998 to 2008.
- Successfully completed an Every Drop Counts (EDC) Business Program Diagnostic Review.
- Rainwater tank and greywater reuse workshops were held to assist residents to install tanks and reuse greywater within their homes.

CASE STUDY

LANE COVE COUNCIL – Blackman Park Stormwater Reuse Plant

Blackman Park is the largest sporting reserve in the Lane Cove Local Government Area. It consists of sporting grounds, picnic areas, large flat open space and river foreshore Bushwalks. It is located beside the Lane Cove River and next to the Lane Cove West Industrial Park.

In Council's Water Savings Action Plan, Blackman Park was identified as a site requiring improved water management; the park was irrigated via inefficient sprinkler systems fed by town water.

To improve the water sustainability of the park Council launched a project to install a massive 360,000L rainwater tank integrated into a new sophisticated in-ground irrigation system. Filling a tank of this size would require some innovative catchment techniques. To this end, Council partnered with businesses in the adjacent Lane Cove West Industrial Area to use their large roof spaces as a catchment.

The project comprised other water efficient measures including the installation of spring loaded taps in the picnic areas, the decommissioning of surplus taps and the installation of AAA shower heads and dual flush toilets in the sports change rooms.

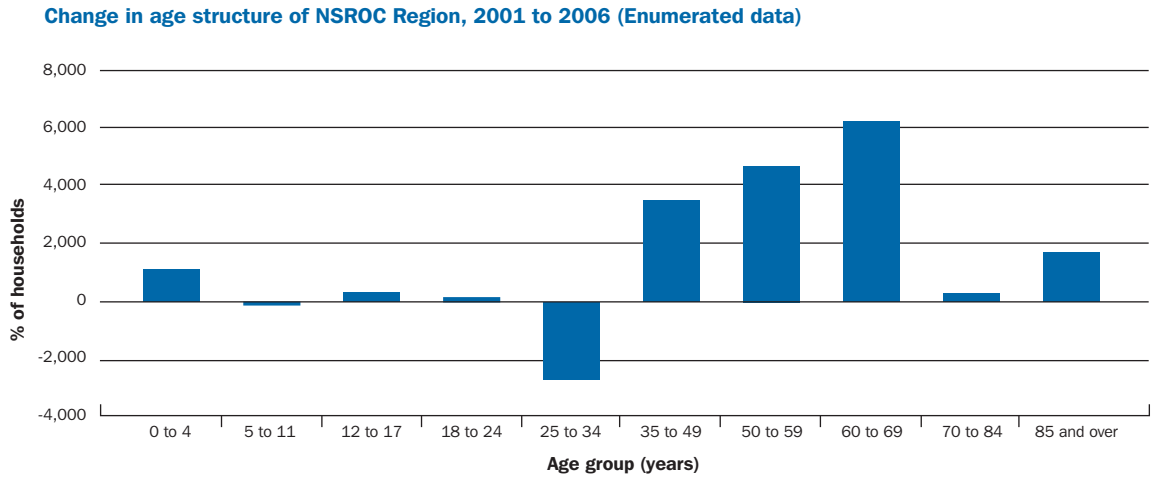
This project has made big inroads in making Blackman Park a sustainable water site for the enjoyment of the community.

COMMUNITY HEALTH

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

The northern Sydney region's population is steadily rising, and is also ageing. Between 2001 and 2006 the NSROC regions fastest growing aged groups were those aged above 49 years with the largest increase those aged 60 to 69 years. The growth rates in these age brackets exceed the NSW statistical average.

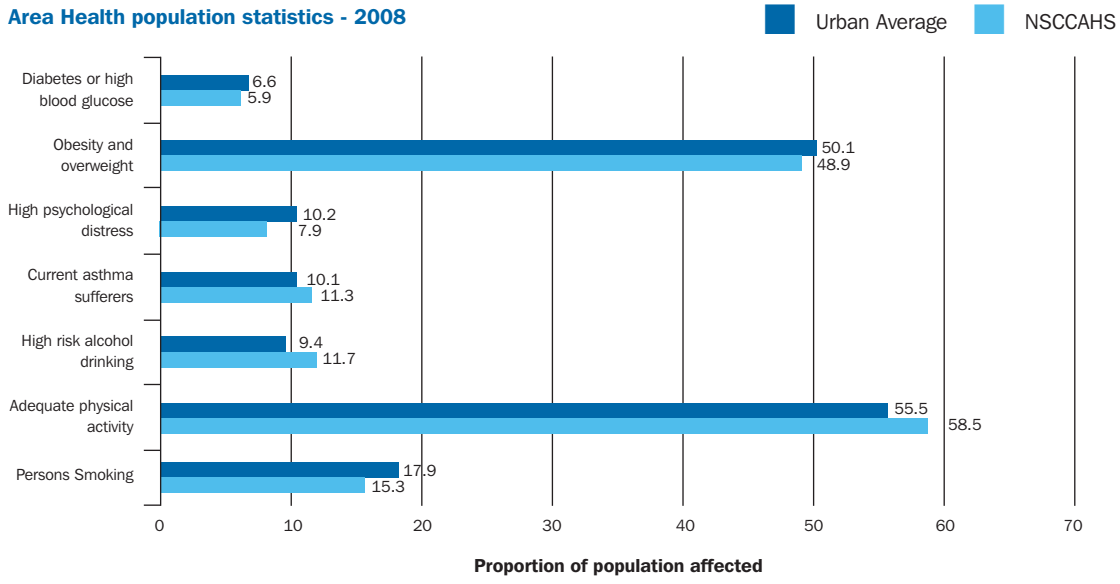
Figure 26: Age Structure in NSROC Region



Source: Australian Bureau of Statistics. 2006 and 2001 Census of Population and Housing (Emunerated)

Supporting a larger population, particularly with increasing aged and dependents, can put pressure on health services and community groups. For example, it has recently been estimated the number of Australians with dementia will double to 592,000 by 2030 and nearly double again to 1.13 million by 2050 (Alzheimer's Australia 2009). Areas with older populations will see a rise in these aged related diseases and consequently higher levels of care and community support will be required.

Figure 27: Key population health statistics for North Sydney and Central Coast Area Health Service (NSCCAHS) 2008



A growth in population also results in more pollution caused by increased traffic, energy consumption and waste generation. Pressures on community health include lifestyle-related diseases such as obesity, stress and smoking-related disorders (declining in real terms).

Specific council level health data is not currently available. However the NSW Department of Health Survey does provide detail at an Area Health Service level which can be used as a broad indicator of the health of the NSROC community. Some key data from the Northern Sydney Central Coast Areas Health Services, which incorporates the NSROC council area, is shown in Figure 27 (previous page).

The Environment and Health

Generally it is difficult to demonstrate broad, direct causality between environmental impacts and community health. Despite this lack of direct causality Councils have no doubts that efforts to sustain environmental quality and to encourage physical activity will contribute to improved community health outcomes.

Direct community/ environmental health issues can be identified in some circumstances. For example specific pollution incidences such as chemical spills, exposure to asbestos and heavy metal poisoning can have significant community health implications. Many health problems are only discernable over time and after considerable or repetitive exposure. And although councils are not frontline agencies in managing community health, they can play a significant role in managing the environment to minimise the effects on the community, and in working with health agencies and services to educate the community on health-related matters.

Helping Our Communities Stay Healthy

NSROC initiatives on community health take two forms:

- NSROC advocates for key health outcomes including provision of direct health services and complementary environmental and health management; and,
- Member councils provide hands-on, local community health programs and facilities.

The health issues faced by NSROC residents parallel most urban centres. Weight and diet related health issues, such as heart disease, are the primary areas of concern. However age related and mental health issues are also on the increase. As a consequence active healthy living initiatives are a key focus of council programs.

Lane Cove Council extended its very successful cooking demonstrations with a range of healthy lifestyles cooking classes aimed at promoting social interactions, networking and nutritional skills. The HEART program (Healthy Eating and Recreational Time) offered seniors the opportunity to take part in a series of cooking classes focusing on different cuisines such as Italian, Japanese, Spanish and Indian, and simple meals they can cook at home. To celebrate what participants learn in the classroom they later share a lunch in a local café of the same cuisine.

As men have specific health issues affecting them, Council also targeted some very effective men's health initiatives. This included a series of Men's Cooking classes and the 'Blokes Day at the Shed'. Each week the men participated in cooking the recipes and then shared the meal together. The classes were extremely successful with all men reporting back each week that they had used the used the recipes and felt more confident when they were cooking.

The 'Blokes Day at the Shed' was a mammoth effort undertaken in conjunction with the Lane Cove Men's Shed. Men were invited to 'put their bodies over the pits' to have a check up and find out if their bodies were 'road worthy' or if they needed a bit of work. The Pit Stop was busy all morning with men going through their 'work orders' checking out their oil pressure (blood pressure), duco (skin cancer) torsion (flexibility) chassis (waist check) etc. Whilst several men were identified with some potentially serious conditions the 'mechanics' commented on how fit and well the majority of the men were. Running simultaneously with the Pit Stop was a cooking demonstration focusing on simple recipes and a variety of stall holders (Glaucoma Australia, Health Lifestyles, the Continence Foundation, the Stepping On Program etc) where men could get information, resources and ask questions.

Ku-ring-gai Council aims to achieve physical, mental, ecological and social wellbeing within its community and environment. Council offers a number of community health, recreation and leisure programs to encourage and assist residents to stay healthy. Some programs include environmental walks and talks; bush neighbours community days; Art Centre activities; children's immunisation program; Ku-ring-gai community shed; seniors shuttle bus service; Libraribus service; Spring into Action seniors activities and tours; parenting forums; and the Active Ku-ring-gai recreation program (see case study). Participation in each of these programs has been strong indicating that many Ku-ring-gai residents are willing to remain physically and socially active in their community.

CASE STUDY

WILLOUGHBY COUNCIL – Department of Housing Community Garden

A feasibility report began in August 2008 to find suitable sites for Community Gardens in multi-unit residential areas located in the Willoughby City Council area. The report was in response to the success of Willoughby City Council's Community Garden in Northbridge, the growing importance of access to affordable, fresh food and the increasing need to avoid social isolation in the community. One of these sites was the Housing NSW Phyllis Burke Complex, Barton Road, Artarmon which houses approximately 300 tenants. Open Space Community Projects Officer, Jan Felton, presented the proposal of a Community Garden at the complex to an Interagency meeting which included, tenants and Housing NSW officers.

All were keen to have a Community Garden built at the complex. A successful launch was held on 6 June 2009. Council provided design expertise, materials and labour for the first garden bed, which included vegetable and herbs, and was constructed with the assistance of tenants from the complex, community gardeners from the Community Garden located in Northbridge and residents from the surrounding area. Interagency organisation Sydneycare provided a BBQ lunch for all. Housing NSW now plans to install a water tank to water the garden bed and will supply materials for the next garden bed. This project hopes to help people become more self sufficient by growing their own food, and also promotes community health. Willoughby City Council also hopes to use this community garden as a forum not only for growing fresh food but also to engage residents in recycling initiatives and composting waste.

The **North Sydney Council's** Coal Loader Garden Project was delivered as eight one hour sessions from September to December 2008, with 62 students from Years 3 and 4 of North Sydney Demonstration School at the former Coal Loader site in Waverton. Each session consisted of a half hour practical gardening lesson and a half hour theory lesson (relating to the benefits of healthy eating and physical activity). Council also continued to provide the free child immunisation service, as well as various arts and recreational activities, for example during Seniors Week and Mental Health Week, not to mention the ongoing Creating Wellbeing program.

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

Hornsby Shire Council's Community Services Team ran a number of health projects for the community including:

- BRINK – DVD Project/Young Women (via the Hornsby Community Drug Action Team) conducted several workshops with local high school students on the topic of binge drinking, particularly amongst young women. They developed a working party that worked with paid actors/media to develop a script, then acted, produced a short film, then a DVD resource on binge drinking for local high schools, providing healthy alternatives for young people instead

of alcohol. Received an award nomination from the Australian Education & Rehabilitation Foundation. Story went into popular young women's magazine, "Dolly". 500 free copies were distributed around Hornsby, Sydney, New South Wales, interstate and overseas.

- Gal@(h) – in partnership with Twenty10, run this fun and educative group for same sex attracted young people where we explore healthy relationships, mental health, safe sex etc.
- Exercise Groups – in partnership with local GP's ran several low impact exercise classes for over weight/obese young people at the Hornsby Youth & Family Centre over an 8 week period, providing information on healthy food options.
- Drug & Alcohol Free Events – the Youth Services team have participated in over 15 events throughout the Shire, from movie nights to band nights and community days, where alternative healthy options were provided to young people, including healthy food, sporting events and passive and active activities. All of these fit within the policy of the Youth Service Team's no drugs framework.
- In partnership with Breastscreen NSW, Hornsby Shire Council organised an information session for Mandarin speaking seniors with the interpreter last November. Information on health issues and local services were also provided to the participants.

Hunter's Hill Council has been striving to meet goals outlined within its social and cultural plans. Supporting activities for seniors including walking groups (some lead by the Mayor!), ferry cruises, gentle exercises and table tennis have all benefited elderly residents. Youth activities have included a number of successful skate days: Council is now planning to construct a permanent skate facility to encourage outdoor activities for local youth. Children's services have been supported through library school activities and story telling. Local playgrounds continue to be refurbished and sunshades provided.

The **City of Ryde** continues a successful partnership with NSW Health delivering vaccinations to children aged 0-4 years as recommended by the National Health and Medical Research Council (NHMRC). High rates of completed immunisation amongst this age group in the northern Sydney region are a positive community response to the Immunise Australia program, as delivered at the City of Ryde's immunisation clinic. Over 2,200 children attended the immunisation clinic for vaccinations in the year ending June 2009. Accredited immunisation nurses provide an efficient and professional service to families with young children vulnerable to the spread of communicable diseases like whooping cough and measles. Immunisation clinics are held on the second and fourth Tuesday of each month and parents may chose to attend either a morning or evening session. This service is available for all children from newborn to 4 years of age regardless of place of residence.

CASE STUDY

KU-RING-GAI COUNCIL – Active Ku-ring-gai

Offering a range of enjoyable recreation programs in a relaxed, social setting, Ku-ring-gai Council's Active Ku-ring-gai program provides local and affordable activities to encourage residents to remain active and enjoy the LGA's parks and recreation facilities. Participants have provided feedback that the programs are meeting their fitness and social needs. This year, 270 residents participated across the eight programs available, with the most popular activities being yoga, social tennis and gym-without-walls. The online booking forms, created last year, have proven very successful and convenient for residents to use. New classes being offered in 2009 include fitbox (with a second class being added in Term 2 due to popularity) and Thursday social tennis. Ideas for new programs in Term 4, such as golf, are currently being investigated.

3 Bushland and Biodiversity

Bushland and Biodiversity

The NSROC region covers more than 680 square kilometres and includes more than 7000 hectares of bushland. Some of the largest tracts of bushland in the Sydney metropolitan area are located in the region. The condition and management of bushland is particularly important to residents, and the amenity provided by bushland is one of the reasons they choose to live and work there.

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. The community values highly native bushland for its cultural, recreational and aesthetic values. It contributes to air and water quality, and provides unique habitats essential for the preservation of native flora and fauna.

Bushland conservation 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. Its economic value includes its significant contribution to local economies through tourism and leisure related activities.

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

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

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

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

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

Existing Bushland in the Region

Most of the NSROC's bushland areas can be found in the north, which includes many relatively undisturbed tracts protected within national parks. Most vegetation is confined to nutrient-poor sandstone-based soils in steeply sloping areas and gullies. However, remnants of plateau vegetation found on shale and transitional soils, such as the Blue Gum High Forest and the Turpentine-Ironbark Forest, can still be found.

- The largest member of NSROC, **Hornsby Shire Council**, is known as the bushland shire because of its extensive bushland areas and scenic amenity. Bushland areas cover more than 65 per cent of the shire with the council managing about 5750 hectares. This includes the 3830 hectare Berowra Valley Regional Park, jointly managed by the council and the DECCW.
- **Hunter's Hill Council** has 30 hectares of remnant bushland on public land, mostly located along creeks and foreshore edges. Although small in area, along with Lane Cove, these areas of bushland provide a valuable link between Sydney Harbour and Lane Cove National Park. Considering the extent and intensity of urban development as well as the proximity to the Sydney CBD, these bushland areas are significant not only on a local, but also on a regional scale. Adjoining bushland on public space along the Lane Cove River foreshores is

privately owned land, and benefits from a 50 metre foreshore protection zone. This area is covered by a site-specific development control plan whereby no building is allowed within 50 metres of the foreshore, and remnant vegetation has to be retained.

- In **North Sydney Council** there remains almost 50 hectares of bushland located mostly on the foreshores of Middle Harbour and Port Jackson. This represents only 4.5 per cent of the original bushland cover. Despite this relatively small area of bushland, the variety of habitat types and their proximity to larger bushland areas in neighbouring council areas result in a surprisingly diverse array of native flora and fauna species. The council is committed to the ongoing conservation and recovery of these areas for the benefit of the community and the bushland's own intrinsic value.
- The **City of Ryde** has 355 hectares of parkland divided into 207 parks of which about 205 hectares is classed as natural bushland. This gives an average size of 1.72 hectares; in reality venues vary in size from the smallest (less than a single house block) to the largest (the Field of Mars Reserve, an area of 51 hectares). The main aim of bush regeneration and management are to regenerate, protect and preserve urban bushland areas within the LGA for the enjoyment of future generations.
- **Willoughby City Council** recently resurveyed the native bushland that occurs within the LGA using aerial photography. As a result, the reported area has increased. There are 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 Council** has more than 100 bushland reserves comprising 1100 hectares of bushland. The LGA also adjoins three national parks (Garigal, Lane Cove and Ku-ring-gai Chase). Most bushland reserves are small, isolated pockets of less than one hectare, with most bushland held in 10-12 larger reserve areas. The major reserves are continuous with adjoining National Parks, and form valuable wildlife corridors.

Figure 28: Bushland across the NSROC area in 2008-2009

Council	Total area of bushland in ha	Total area of bushland in LGA under council control	Total area of bushland in LGA %
North Sydney	50	50	100
Lane Cove	123	93	75
Hunter's Hill	40	30	70
Ryde	559	209	38
Ku-ring-gai	3148	1161	37
Hornsby Shire	38089	5750	11
Willoughby	338	290	85
NSROC	42347	7583	18

Bushland Conservation

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

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

The northern Sydney councils employ professional bush regenerators who - as well as helping to regenerate the bush – undertake ecological and hazard-reduction burning, track construction and maintenance, and pest species control. The councils also undertake on-ground works to maintain and rehabilitate bushland areas.

Bushcare groups also involve the community in restoring degraded bushland in their neighbourhoods. More than 300 bushcare volunteers work across the region areas to restore degraded bushland environments in their local neighbourhoods and to promote community awareness. This is the most important resource to the community equating to over 50,000 hours valued at over $1million.

Figure 29: The contribution of bushcare volunteers in the NSROC region in 2008-09

Council	Volunteer numbers	Volunteer hours	Value of hours (in dollars @ $25 per hour)
North Sydney	360	4 929	123225
Lane Cove	246	3 896	97400
Hunter's Hill	100	2 192	54800
Ryde	574	4 730	118250
Ku-ring-gai	950	12 000	300000
Hornsby Shire	850 (650 active)	16 200	405000
Willoughby	350	6 505	162625
NSROC	3230	50452	1261300

Hornsby Shire Council's bushland regeneration program consists of 50 long term sites predominantly on Council owned land but also on Crown land and Department of Climate Change and Water land that is co-managed with Hornsby Shire Council (Berowra Valley Regional Park). Additional bushland regeneration sites are taken on under grant projects and when other external funding is available. Approximately 90% of the sites are contracted out to bush regeneration companies, currently there are eleven (11) suppliers under a new tender that was finalised in August 2009. Works vary from restoring small degraded urban bushland remnants to mitigation of weed sources that threaten larger and more pristine bushland reserves.

Bushland management continues to be an integral part of the council's service to the **Lane Cove** community. Joint projects between the two smallest NSROC councils, Hunter's Hill Council and Lane Cove Council continue to be successful with the partnership continuing to strengthen through a joint wetland management and rehabilitation project.

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

CASE STUDY

WILLOUGHBY COUNCIL – Bushland Interpretive Program

The Willoughby City Council Bushland Interpretive Program facilitates a connection with the local environment for the residents of Willoughby. Every year thousands of children and adults attend guided walks, interactive displays and educational activities about the local environment. A quarterly program of walks, talks and events is distributed to the wider community advertising specific activities such as bird watching walks, bush tucker walks, spotlighting activities, preschooler bush scrambles, school holiday programs and even bush poetry readings. Between July 2008 and June 2009 a total of 3,714 people participated in the Bushland Interpretive Program, including more than 2,000 local school children who have benefited from interactive outdoor learning experiences such as bushwalks, indigenous seed propagation, plantings, environmental talks and other

curriculum based environmental activities. The program aims to encourage the local community to live with the local natural environment in a sustainable way by raising awareness and understanding of local bushland ecosystems through education programs and fostering participation in the preservation of bushland.

CASE STUDY

NORTH SYDNEY COUNCIL – Wildlife Watch

The aim of Wildlife Watch is to encourage the community to report wildlife sightings so that Council's database of local fauna can be constantly updated. This information is used in the management of our bushland areas, to assist in environmental planning decisions, the development of wildlife corridors, and for the inclusion in the National Parks and Wildlife Service's Wildlife Atlas. Wildlife Watch also helps raise awareness of wildlife management issues, such as wildlife using weeds as habitat, population fluctuations, migrant and nomadic species that drop in and other important observations.

Over 70 residents and interested people able to identify what species of wildlife they could see or hear, either at home or elsewhere within the LGA, have reported their fauna observations to Council. This assists in the management of the habitat and wellbeing of local fauna and is an important part of our fauna database. Any information on threatened species is collated and sent to the National Parks and Wildlife Service Atlas.

This information is used for the best practice management of our bushland areas, to assist in environmental planning decisions and the development of wildlife corridors. Wildlife Watch also raises the community's awareness on wildlife management issues through information displays and seminars.

North Sydney Council co-ordinates bushland rehabilitation activities at 12 sites around the Port Jackson & Middle Harbour foreshore. Activities include weed control, facilitated natural regeneration, track maintenance and site stabilising activities, and are undertaken by council bushland staff, professional bush regeneration contractors and Bushcare volunteers. The Council's Adopt-a-Plot program continues to expand and is now engaging with bushland neighbours in Cremorne Point, Cremorne and Wollstonecraft. The success of the Cremorne Point adopt-a-plot project was demonstrated by the higher-than-anticipated participation rates, with a majority of participants making an ongoing commitment to restoring degraded bushland adjoining their properties. A significant proportion of the Cremorne Reserve has been 'adopted', and bush regeneration has been done on previously untouched, weed-infested slopes. The resident white-browed scrubwren is continually monitored throughout the project and provides an indicator for the rate and pattern of dense weed clearing, which is identified as the scrubwren's key habitat in this reserve.

The management of bushland is a top priority for **Ku-ring-gai Council**. A threatened ecological community mapping project has been a priority for the year, and is nearing completion. The mapping will be used to assist both operational and strategic management of council's natural areas. A review was also conducted of the Ku-ring-gai Bushland Plan of management. This is a 5 year plan which directs management of lands categorised as natural area under the Local Government Act 1993.

Lands purchased in partnership with the federal government and the community, through the Blue Gum High Forest action group, have been incorporated within council's bushland reserve, 'Browns Forest'. The on going management of this area and the adjacent Dalrymple Hay Nature Reserve is continuing under a collaborative federal, state and local steering committee. Activities have included the listing of Browns Forest as Conservation Agreement (under DECCW) and requiring dog exclusion to align with the adjacent nature reserve. Creek rehabilitation and bush regeneration have continued as part of Council's maintenance programs inline with the DECCW best practice management guidelines.

Priority projects for **Willoughby City Council** in 2009 are the protection and restoration of natural areas. These projects aim to preserve wildlife, restore creeks, expand environmental education, prevent pollution and protect the natural environment through the Streets to Creeks program. Willoughby City Council's bush regeneration has continued in 2008/09 along with noxious weed and pest species management. Bush regeneration covers all catchments in the LGA including the Lane Cove River; Blue Gum Creek; Swaines Creek; Coolaroo Creek; Middle Harbour; Scotts Creek; Camp Creek / Sugarloaf Creek; Sailors Bay Creek and Flat Rock Creek. Wildlife and biodiversity issues have been publicised at a World Environment Day event in Chatswood Mall (1,000 visitors to the event), Castlecrag Fair (100 visitors to the stall, 1,000 visitors to the event) and bush poetry event (90 attendees) and a Willoughby Wildlife Book is almost complete and will be in print in spring 2009.

In 2009 the **City of Ryde** has continued supporting its bushcare program through the management, supervision and training of bushcare volunteers. The council has provided several short training courses through Ryde TAFE to further the skills of these volunteers. These short courses have received strong support and interest, and are programmed to continue.

OPEN SPACE

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

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

Open Space in the Region

NSROC councils work with the community to maintain a significant amount of open space and to ensure the region remains a safe, healthy and attractive place to live. Within the region, there are 3595 hectares of council-managed open space, amounting to an average of 72 square metres per person.

Figure 30: Open Space areas in NSROC Region – 2008-2009

Council	Volume of open space under council management in hectares	Volume of open space per capita (square metres)
North Sydney	145	25
Lane Cove	157	49
Hunter's Hill	67	50
Ryde	355	34
Ku-ring-gai	1161	114
Hornsby	1285	170
Willoughby	425	62
NSROC	3595	72 (average)

Community Needs for Open Space

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

Despite limited capacity for new or extended open space, work is done within NSROC councils to improve existing facilities for both active and passive recreation, including playground and picnic facilities. Maintenance and upgrading is done to improve the functional and aesthetic qualities of councils' developed open spaces, with particular attention being paid to safety. The ongoing review and improvements of open space is undertaken by all councils as reflected in the example of Hornsby Shire Council's Unstructured Recreation Strategy.

On-going population growth is expected to exacerbate supply problems by increasing the overall numbers of people wanting to use open space. Schools' reliance on public sporting facilities is also expected to rise as student populations grow. Unfortunately, there is limited opportunity for future development of new open spaces within the region. This is because of existing urban development, prohibitive costs of buying sites, topography, and adjacent bushland and natural areas.

Demand for outdoor sporting facilities in most parts of the region exceeds supply during peak playing periods, such as Saturdays. Some schools in the area have no or limited sporting fields, and rely on these public facilities. Ongoing requirements for sports ground rectification, upgrading and maintenance, as well as water restrictions, put additional pressures on the ability of sports fields to carry additional activities.

A new urban open space within the NSROC region is the **Willoughby City Council's** new Chatswood Civic Place project which will redevelop an 11,000 square metre site in the centre of the Chatswood CBD. In addition to the construction of a new library and various cultural facilities including a concert hall, theatre, and retail space, Civic Place will provide a total of 6000 square metres of open space. This new open space will provide a retreat from the busy CBD, particularly for workers, young people and families. There will be places to sit with friends, an outdoor amphitheatre for informal performances and areas to eat and relax. This is an innovative example of how Council can deliver quality open space within an urban context.

CASE STUDY

HORNSBY SHIRE COUNCIL – Unstructured Recreation Strategy

The Unstructured Recreation Strategy was developed by Hornsby Shire Council to provide strategic direction for the management of unstructured recreation facilities in the Shire.

Selected activities are dealt with in the plan including:

- a range of unstructured sports undertaken for pleasure, away from the club competitive environment in social/family settings;
- BMX and mountain biking;
- walking for recreation;
- dog socialisation and exercise;
- skateboarding and in-line skating;
- horse riding trails;
- playgrounds; and
- recreational fishing.

Some high priority policy directions include:

- provide a hierarchy of trails across the Shire to suit a wide range of pedestrian and non motorised wheeled activities; urban footpaths, equestrian and shared trails, bike trails in urban bushland and sealed circuit paths in larger parks;

- consider a managed BMX facility on one site e.g.: Old Man's Valley; and
- consider a range of locations for additional dog off leash areas.

Volume 2 of the Unstructured Recreation Strategy comprises a Skate and BMX Management Policy and Plan.

FIRE MANAGEMENT

Fire heats the soil, cracking seed coats and triggering germination; it triggers woody seed pods held in the canopy to open, releasing seed onto a fresh and fertile ash bed; it clears thick understorey reducing competition for seedlings; it encourages new growth that is food for many animals; and, it creates hollows in logs and trees that are used by animals for nesting and shelter. It can also burn vegetation communities such as rainforest that take hundreds of years to recover, kill threatened species, cause erosion and subsequent sedimentation of creeks and wetlands and open areas up to the impacts of weed and feral animal invasion as well as human access and vandalism (NSW Department of Environment, Climate Change and Water – 2008 website).

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

Bushfire Risk in the Region

In the northern part of the NSROC region, bushland abuts a number of private properties and the possibility of bushfires provides a constraint for new development and redevelopment. In Hornsby Shire Council for example, large areas of land interfacing residential development and bushland have been assessed as medium to high bushfire hazard. *The Rural Fires and Environmental Assessment Act 2002* requires local governments to record on maps the land identified by the commissioner of the NSW Rural Fire Service as bush fire-prone land. Councils are required to prevent development consent being granted for certain purposes on bushfire-prone land, unless the consent authority is satisfied the development conforms to documented bushfire-protection specifications or has consulted with the commissioner.

Figure 31: NSROC Fire Hazard Management 2008-2009

Council	Number of sites of hazard reduction burns	Area burnt (by hectare)
North Sydney	0	0
Lane Cove	0	0
Hunter's Hill	0	0
Ryde	0	0
Ku-ring-gai	5	32
Hornsby Shire	13	67.8
Willoughby	2	0.2
NSROC	20	100

Hazard Reduction in the NSROC Region

Fire management is done in co-operation with the DECCW, community fire units, local bushfire brigades, the NSW Fire Brigades and the NSW Rural Fire Service. Bushfire control measures, including hazard reduction burns, are undertaken. Although these protect property from bushfire hazards, they can also affect biodiversity.

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

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

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

In **Hornsby Shire Council** fire management is undertaken in cooperation with the DECCW, community fire units, local bushfire brigades and the NSW Fire Brigades. There were 599 permits to burn issued to residents predominately within the rural area of the Hornsby Shire to facilitate preparing homes for bushfire events by reducing the amount of fallen vegetation on private property. Fifteen (15) specific sites were treated manually to manage fuel loads along the bushland/ urban interface; this was over one (1) hectare totalling 1.2 kilometres in length along interface areas. Three (3) kilometres of fire trail were maintained through slashing works and 600 metres of fire trail was upgraded through concreting and resurfacing. Twenty eight (28) Bushfire Hazard complaints were received by Council and referred to the NSW Rural Fire Service (RFS) for assessment. Thirty four (34) hazard reduction certificates were issued under the Bushfire Environmental Assessment Code by the NSW Rural Fire Service for residents to undertake prescription burning or clearing activities to facilitate vegetation and fuel management. Thirteen (13) prescription burns were undertaken within the Hornsby Ku-ring-gai Bushfire Management Committee area as part of the 2008/09 Fuel Management Program covering 67.8 hectares of land.

This year was very wet making broad area prescription burns difficult to undertake due to local weather conditions and the availability of RFS volunteers. An increased focus on community education and more areas targeted for manual works are continuing as a result of environmental constraints restricting the prescription burn program. The new Bushfire Risk Management Plan has mapped most of Hornsby Shire as Extreme for bushfire danger and with climate change the risk is likely to increase through time.

Ku-ring-gai Council is responsible for managing 1100 hectares of bushland. Much of this is contiguous with larger natural areas – Ku-ring-gai Chase National Park to the north (with 14,882 hectares), Lane Cove National Park to the south-west (with 601 hectares); and Garigal National Park to the east (with 2150 hectares). Managing the fire risk is a shared responsibility with a number of state and local government agencies through the Hornsby Ku-ring-gai district bushfire management committee and residents. The management of fire breaks, fire trails and hazard reduction burning are the council's main tools for managing risks. Ku-ring-gai Council has established 15 fire breaks interfacing along 10.2 kilometres of high to very high bushfire risk bushland. This number is being added to and eventually all areas that have a very high, high and moderate bushfire risk rating will have fire breaks established at the residential/ bushland interface.

The yearly fire break program is divided into two parts:

The first part of the program covers the treatment of all breaks with a risk rating of very high to high and there are 15 of these extending over 10.18 kilometres. Treatment of these breaks is undertaken at a frequency of once per year.

The second part of the program for 08/09 treats half the breaks with a rating of moderate to high which works out at a frequency of once every 18 months. There are 21 of these breaks extending over 13.4 kilometres. These breaks are divided into two rotations A and B with one rotation being carried out one year and the other in the following year.

The fire break maintenance programme for 07/08 saw 15 very high to high risk rated fire breaks treated and 10 moderate to high risk rated breaks treated. The other half of the moderate to high rated breaks will receive treatment during the following years programme.

Lane Cove Council did not conduct any hazard reduction burns in any of the three areas identified for this treatment in the past 12 months, due to unsuitable weather and the available resources. Hazard reduction work continues to be done as part of the ongoing bush regeneration works in many reserves. Hazard reduction is done by hand at bushfire sites to remove fallen branches, leaf litter and large amounts of green waste, old timber and other rubbish dumped in reserves by nearby residents. Some tree trimming is also done on public land, including where tree branches overhang buildings.

North Sydney Council is part of the Manly-Mosman-North Sydney bushfire management committee, which forecasts planned ecological and hazard reduction burns annually. Hazard reduction is done in accordance with the NSW Fire Brigades bushfire risk management register, and consists of hand removing fuel, lifting, trimming and thinning of continuous canopy, and controlled pile burns along the urban/bushland interface. NSC undertakes ecological burns throughout its bushland, with the aim of increasing and maintaining biodiversity across a number of different ecological communities. Adverse weather conditions prevented Council and the NSW Fire Brigades from undertaking any hazard reduction/ecological burns during 2008.

In the **City of Ryde**, unfavourable weather patterns have hampered the 2008/09 prescription burning program resulting in no areas having a hazard reduction burn. Council has continued its asset protection program manually reducing fuel loads and preparing sites for hazard reduction burns in some natural areas. Council has also continued to maintain and repair all established fire trails and breaks throughout the City. The City of Ryde continues to work closely with NSW Fire Brigades (who undertake the hazard reduction burns) and with surrounding Councils and the

CASE STUDY

KU-RING-GAI COUNCIL – Fire Trails

Ku-ring-gai Council is committed to providing quality fire trails. After 4 years of planning and implementation the fire trails linking North Turramurra and North Wahroonga have now been completed. The new trails were constructed as part of a $1 million project funded by Ku-ring-gai's Environment Levy. It also included construction of two bridges – one at Caley's Point and the other linking Stonecrop Rd to Clissold Rd, Wahroonga. Around $400,000 in State Government funding has also contributed to a number of upgrades. This has included resurfacing some of the pavement areas with concrete; installing safety gates at entry and exit points; build two sandstone rock retaining walls and installing informative signage.

The recently completed fire trails will help to reduce the threat of bushfire by improving access to bushland, making it easier to conduct hazard reduction burns. They also provide a social and environmental benefit to users such as bushwalkers and mountain bike riders by providing safe and controlled access to some of the most amazing bushland in Sydney.

CASE STUDY

KU-RING-GAI / HORNSBY SHIRE COUNCIL – Rural Fire Service and Bushfire Risk Planning

Bushfires are an integral and important part of the Australian environment. Bushfire management in NSW is a cooperative effort involving the whole community and involves a mixture of actions and strategies to minimise the potential for bushfire to affect life, property and the environment.

The Hornsby Ku-ring-gai Bushfire Management Committee (BFMC) is responsible for preparing, coordinating, reviewing and monitoring the Bushfire Risk Management Plan for the Local Government Areas of Hornsby and Ku-ring-gai. The BFMC is a legislative committee formed under the Rural Fires Act, 1997. The committee consists of a range of stakeholders such as land managers, fire authorities and community organisations that ensure the whole community has a say on bushfire management activities.

The Bushfire Risk Management Plan facilitates a coordinated across tenure approach to bushfire risk mitigation and provides a consistent framework and platform of risk assessment. The Plan is a comprehensive document that maps and describes the level of bushfire risk across an area; it identifies the assets at risk and establishes treatment options to safeguard those assets and areas. The Plan is used to determine such things as where mechanical clearing

or hazard reduction burns are conducted, which areas require specialised fire protection and which areas need to be targeted for community education.

An integral part of the Plan is community consultation. Local residents adjoining bushland areas and special interest groups such as managers of nursing homes and schools were invited to comment on the plan. Invitations and information on the consultation were extended through letter box drops, mail outs, media releases and the Hornsby Ku-ring-gai Risk Management Plan web site. Over three hundred people took the opportunity to participate in the development of the Plan by attending community BBQs and information sessions held at ten different venues across Hornsby and Ku-ring-gai LGAs. Over eighty five written submissions on the draft plan have also been submitted to the committee. The community will have additional opportunity to comment on the final draft of the plan when it is on public exhibition.

Following community consultation and public exhibition the Hornsby Ku-ring-gai Risk Management Plan will be endorsed by the Hornsby Ku-ring-gai Bushfire Management Committee and NSW State Bushfire Co-ordinating Committee.

Lane Cove National Park in managing the prescription burning program as part of the Hunter's Hill, Lane Cove, Ryde, and Willoughby Bush Fire Management Committee.

Willoughby City Council resourced the post-fire management of an unplanned burn of 8 hectares of bushland at Chatswood West. All burns are conducted to take account of biodiversity and habitat issues. Burn sites show an increase in diversity of both flora and fauna. New growth after the fires has attracted many fauna species, while the next stage of dense regrowth provides excellent habitat. Willoughby City Council hosted an ecological burning workshop in conjunction with the Nature Conservation Council of NSW to showcase the work carried out in a range of reserves. Council also presented this material at the 'Biodiversity Under Fire' conference in June 2009.

INTRODUCED FLORA AND FAUNA

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

Feral Animals, Pests and Invasive Weeds

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

Weeds are a huge economic burden for NSW and are a major problem in the NSROC region's bushland areas. Water Primrose (Ludwigia peruviana) has now been found in Hornsby Shire and control of this infestation started immediately. *Paspalum quadrifarium* is now invading some local bushland reserves predominantly from road edges and drainage lines. It out-competes other plant species and is difficult to eradicate.

Noxious weeds include:

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

Managing the Impacts of Introduced Species

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

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

The program's aim is to protect native wildlife, especially threatened species from fox predation. Evidence is emerging that local native species, such as swamp wallabies, brush turkeys and lyre birds are making a comeback after fox baiting, with sightings where they have not been seen for more than 20 years. Cats are trapped only in bushland where there are identified environmental effects from non-domesticated animals. Rabbits are controlled when they affect bushland. The Indian Myna, an introduced bird species, has also been targeted in urban areas. This action is mainly in response to a perceived abundance of the species and their threat to native birds. It has involved the trialling of specific cage traps designed for controlling this pest species.

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

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

The **City of Ryde** is currently undertaking an inspectoral and educational program of noxious weeds on 390 private properties surrounding Darvall Park, as well as the nearby Outlook and Miriam Parks. The project is called the Darvall Park Noxious Weed Program and it follows on from the pilot Brush Farm Park Noxious Weed Program, which commenced in 2001 and included 430 properties. The program aims at educating

residents about how to identify and control noxious weeds on their land and Council offers incentives such as free information brochures, free kerb-side pickups of noxious weed material, and also free native tubestock plants on request.

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

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

CASE STUDY

NSROC COUNCILS – Vertebrate Pest Control Programs In NSROC Region

All NSROC Councils support and participate in the efforts of the **Urban Feral Animal Action Group** (UFAAG). The Group marshals over 22 agencies comprising local government, NSW NPWS, Forests NSW, Cumberland Livestock Health and Pest Authority, Department of Primary Industries (now Department of Industry and Investment), Sydney Harbour Federation Trust and Taronga Zoo.

Baiting is undertaken to conserve native animals including threatened species, specifically the endangered southern brown bandicoot (NSW TSC Act (1995) and EPBC Act). The program implements actions outlined in the NSW Fox Threat Abatement Plan 2002 (currently under review by NPW/DECCW) and the NSW NPWS Sydney North Region Pest Management Strategy 2008 -2011

In the period July 2008 – June 2009 twice annual baiting was undertaken in August and March by:

- Ku-ring-gai Council: Lovers Jump Creek reserve (North Turramurra) August only, Moores Creek Reserve (Roseville) March only, Surgeon White Reserve & Ku-ring-gai Creek Reserve (St Ives) March only
- Lane Cove Council: Ventemans Reach Blackman Park North to Stringybark Creek (Lane Cove)
- Ryde Council: Brush Farm Park & Field of Mars Reserve (Ryde)
- Willoughby Council: Clive Park (Northbridge), Northbridge Park Flat Rock Gully (Northbridge/ Naremburn), North Escarpment (Castlecrag), H.J. Reid Reserve (Middle Cove), North Arm Reserve, H.C. Press Reserve, Explosives Reserve, H.D. Robb Reserve (Castle Cove), Blue Gum Park, O.H. Reid Reserve, Mowbray Park (Chatswood West)
- North Sydney Council: Balls Head Reserve (Waverton)

NPWS Sydney North Region undertakes 1080 baiting for fox control 4 times per annum.

NPWS Sydney North Region ceased 1080 baiting in Ku-ring-gai Chase National Park in November 2008. Baiting was undertaken 4 times annually for 8 years 2000 – 2008. It is a recommendation of the Fox TAP review that the treatment and non-treatment areas be swapped. Therefore baiting commenced in Garigal NP in 2009. Baiting was undertaken in March and May / June 2009. NPWS also undertakes fox control in non Fox TAP sites i.e. Lane Cove National Park and Berowra Valley Regional Park twice annually. NPWS Sydney North Region monitors fox activity in Ku-ring-gai Chase NP and Garigal NP twice annually using prints/sand pads.

Members of the UFAAG implement actions outlined in the Sydney North Rabbit Management Plan 2007 – 2012 and annual agency action plans. Management actions have included:

- Pindone baiting programs on Council reserves, sports fields and golf courses, and cemeteries
- Shooting programs in picnic areas and other open space with National Parks
- A strategic release in February of RHD Rabbit Haemorrhagic Disease in February 2009. North Sydney LGA is currently considered rabbit free.

Willoughby City Council implements strategic feral cat control by cage trapping and humane euthanasia in bushland reserves. NPWS undertakes cat control in known southern brown bandicoot habitat.

North Sydney Council, a member of UFAAG (Urban Feral Animal Action Group), undertakes fox baiting twice annually in coordination with adjoining Councils, National Parks and other public land managers in the Sydney North region. 2008 saw the resumption of fox baiting in Balls Head Reserve after an absence of some years. The program was highly successful, with two confirmed fox kills being recorded. The overall benefit of this regionally coordinated fox control program, which has been operating since 1999, has been demonstrated (anecdotally) through the strengthening of native wildlife populations in the area and the movement of Brush Turkeys back into North Sydney's bushland reserves. NSC is also working with residents to control domestic animals that damage our local biodiversity by implementing actions prescribed under the NSW Companion Animals Act. All of the Council's bush-regeneration contract teams, staff and Bushcare volunteers are regularly engaged in the eradication of noxious and environmental weeds.

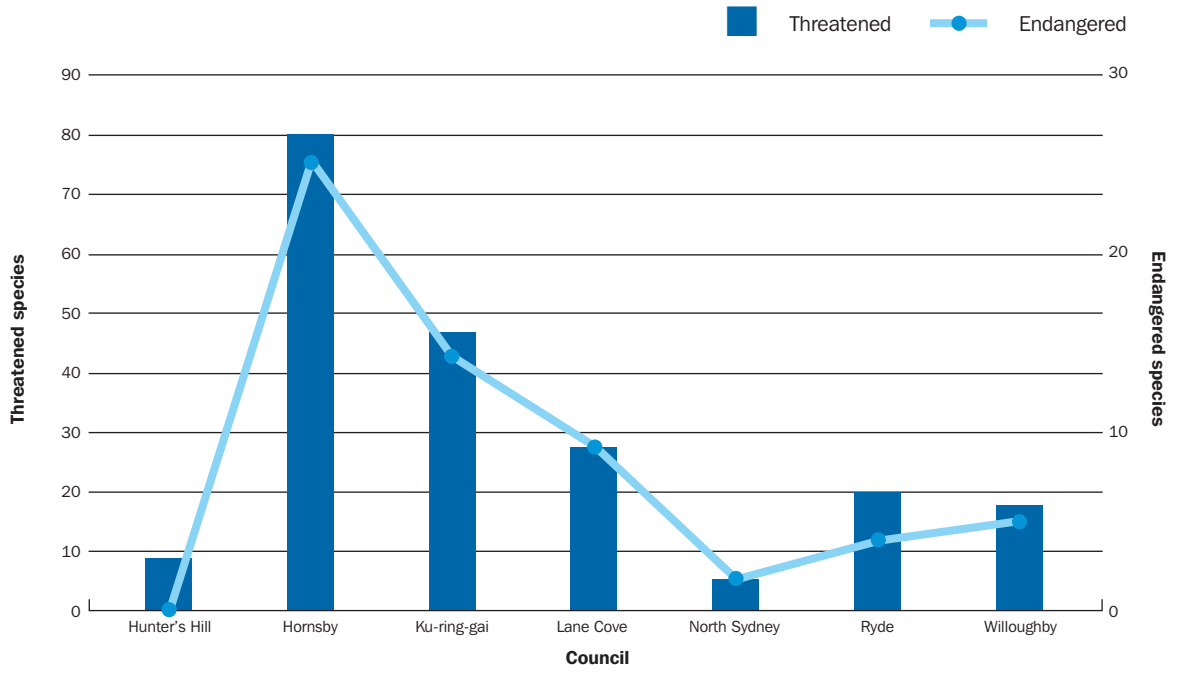
The pressures on native vegetation in **Hornsby Shire** have remained the same, however due to threatened species legislation and better vegetation community identification, the number of threatened plant communities in the Hornsby Shire has increased. Hornsby Shire has many noxious and environmental weeds. Urban development, exotic gardens, stormwater run off and fragmentation of bushland all contribute to an environment which favours introduced flora and fauna species. There are 100 noxious weed species listed for HSC, however not all of them have been recorded in the area but are listed as noxious if they were present. Feral animals on the increase include rabbits in the rural and urban areas and Indian Mynas around commercial and suburban areas. Fox populations in the area appear to be decreasing following the ongoing implementation of the Regional Fox Control Program which commenced in 2000.

NATIVE FLORA AND FAUNA

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

Threats to native fauna diversity in the NSROC region include habitat modification and destruction, feral animals and free-ranging domestic pets. Several threatening processes have been identified and listed under the Threatened Species Conservation Act 1995. Factors including bush rock removal, habitat modification and removal, modification

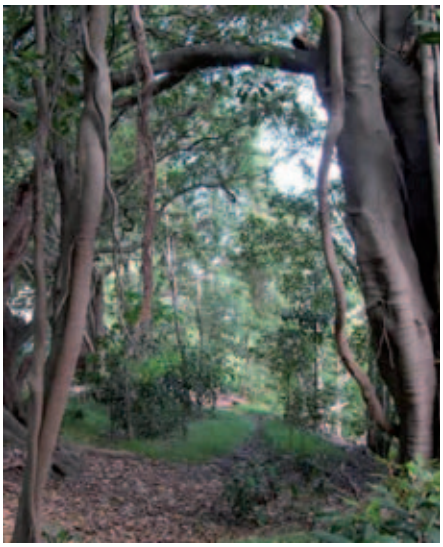
Figure 32: Number of threatened and vulnerable species in the NSROC Region in 2009 (NSW DECCW 2009)



of watercourses, predation by foxes and feral cats and inappropriate fire regimes have all been listed as threatening processes that may lead to the decline or extinction of various native flora and fauna species.

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

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



The State of Native Flora and Fauna in the Region

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

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

Vegetation Communities in the NSROC region include:

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

See Appendix 3 for list of all threatened flora and fauna in the NSROC region.

Conserving our Native Flora and Fauna

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

Councils run community nurseries, specialising in local indigenous plants propagated by staff using local seeds and cuttings. These nurseries supply plants for councils' planting and re-vegetation needs. The NSROC councils are involved in a number of other activities designed to help conserve native flora and fauna including:

- signposting wildlife protection areas, and developing a wildlife protection program which includes feral animal control and domestic pet awareness and education
- developing and undertaking the urban habitats (gardens for wildlife) program in major biodiversity areas
- continuing native plant give-aways at community nurseries to encourage residents to plant local native species, thus improving the quality and amount of habitat available to native birds and animals
- working with bushcare volunteers and groups, and ensuring all volunteers are trained to work safely and effectively in achieving the plans' environmental aims

- preserving and enhancing biodiversity on private property in rural areas
- promoting the biodiversity conservation strategy and action plan
- continuing education and raising community awareness about bushland and biodiversity, and providing training for council staff in working in and around bushland
- continuing joint management initiatives such as green web to address habitat, species and corridor issues;
- developing and implementing management plans for all council-managed natural areas
- growing native flora in community nurseries and distributing these to residents to be used in the local area

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

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

Lane Cove Council's community plant nursery continues to grow, providing the parks, gardens and the bushland of the LGA with healthy, locally grown plant stock. The use of plants grown from remnant seed helps protect core bushland areas, strengthening habitat and vegetation corridors and maintains biodiversity. Community plant nurseries play an integral role in boosting local area conservation awareness. They also provide another way for local communities to become involved in their local environments.

Bushland covers over 70% of the **Hornsby Shire** area with an underlying geology of Hawkesbury Sandstone and Winnamatta Shale. It has high biodiversity values with over 1,000 native vascular plants, 338 native vertebrate species and an infinite number of invertebrates. In 2008 vegetation mapping was reviewed and updated identifying 34 native vegetation communities. Twenty-eight of these communities are significant at national, State, regional and local level. Hornsby Shire Council has declared 33 bushland conservation reserves Wildlife Protection Areas and has undertaken fauna surveys within eight of these areas to gain a better understanding of the Shire's wildlife and habitat values.

Hornsby Shire Council is committed to protecting and improving its local natural environment through its Biodiversity Strategy, on ground bush regeneration work and a large volunteer Bushcare Program. Council also provides free native plants to residents four times a year and is working to encourage local nurseries to provide local native stock to residents for their gardens. The Bushland and Biodiversity Management Team run the Gardens for Wildlife workshop series which educates residents about enhancing biodiversity such as building frog ponds, creating native gardens and identifying bird species. In addition, Hornsby Shire Council along with Ku-ring-gai and Willoughby councils are running a program called Greenstyle. This is a joint grant project aiming to assist residents to make their homes and gardens more eco-friendly. Three (3) Greenstyle advisors have been employed to assist residents to get started, starting with a personal home and garden assessment, followed by advice, support, free workshops and access to a range of suppliers and products to improve their home and lifestyle.

Ku-ring-gai Council refined mapping of known threatened plant species on public land. This included providing an exact location, details on plants in addition to recording photographic records of their condition and any associated threats were recorded on council's GIS system.

Mapping of endangered plant communities started in January with expected completion by December 2009. It builds on the work with two major catchment authorities, the Sydney Metropolitan and Hawkesbury Nepean, DECCW and the Royal Botanic Gardens Sydney.

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

Willoughby City Council installed artificial fauna shelters at key locations across Willoughby. In total, 50 arboreal shelters and 15 terrestrial shelters were installed during 2008/2009. Workshops were also held to train 40 volunteers in how to use and construct shelters.

The **City of Ryde** has completed a comprehensive flora and fauna survey of 54 urban bushland reserves throughout Ryde LGA. Native and exotic flora and fauna species in each of the bushland areas surveyed have been discovered and mapped according to DECCW methodology.

Biodiversity "hotspots" and areas of high conservation value have been identified, scientific quadrats layed and a masterplan is now being developed that will seek to maximize the retention of native biota by creating or enhancing wildlife corridors across the LGA and helping to determine areas requiring conservation or improvement, in particular relating to threatened species and communities.

A majority of the Ryde LGA was historically heavily timbered (Turpentine-Ironbark Woodland) and well represented in reserves such as Field of Mars Reserve, Darvall Park, Lambert Park, Brush Farm Park, Denistone Park, Burrows Reserve and Pidding Park. In only a few locations has Blue Gum High Forest been found (such as in Brush Farm Park and in an impoverished form in Denistone Park). Western Sydney Gully Forest has survived in protected valleys in the LGA, at Pembroke Park, Portius Park, Pidding Park, Field of Mars Reserve; while Sydney Sandstone Gully Forest has survived along the Parramatta River at Glades Bay Park and Looking Glass Bay Park.

Small areas of mangroves also occur along the Parramatta River at Glades Bay Park and Looking Glass Bay Park, and near the Lane Cove River at Field of Mars Reserve. Remnant saltmarsh areas are present in the Field of Mars Reserve and Glades Bay Park. With respect to fauna, few reserves in the Ryde LGA still retain native terrestrial mammals. Many animal groups have been severely depleted as a result of the development of the LGA (in particular terrestrial mammals, bats, large reptiles and frogs). Birds are the best represented fauna group in the LGA. Sites with over 100 species of native fauna have been identified at Field of Mars Reserve and Pembroke Park/Lucknow Park.

North Sydney has only 45 hectares of bushland left, a small percentage of what was once abounding in native fauna and flora. Each garden that replaces exotic and hybrid plants (plants which can attract aggressive birds) with native plants, increases the resources available to our wildlife. Eliminating weeds with seeds, fruits and propagules that are easily transported into bushland from gardens also saves Council time and money restoring bushland that becomes degraded due to various dispersal agents.

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

4

Water

Water

Water resources are essential to the community and the natural environment. The pattern of human demands on water resources does not necessarily reflect the pattern of flow through aquatic environments. The same activities that place demands on water quantity may also put pressure on water quality, and this is becoming increasingly apparent during a period of continuing drought, climate change and water restrictions.

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

WATER QUALITY

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

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

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

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

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

Regional Water Quality

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

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

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

Figure 33: Interpretation of SIGNAL-SF scores

SIGNAL SF Score	Habitat quality
Greater than 6.5	Clean Water
Between 5.2 and 6.5	Possible mild organic pollution
Between 3.8 and 5.2	Probable moderate organic pollution
Less than 3.8	Probable severe organic pollution

Source: Chessman, B.C. (2003b). SIGNAL2.iv – A Scoring System for Macroinvertebrates ('Water Bugs') in Australian Rivers. User Manual. National Heritage Trust. Report No.31.

Maintaining Water Quality

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

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

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

The NSROC councils of Lane Cove, North Sydney and Willoughby City have recently commenced a Lower North Shore Regional Water Quality Monitoring Program. Councils have engaged a contractor to undertake sampling of creeks and to analyse the samples for physical, chemical and biological parameters. Regular and consistent sampling across the four council areas will allow the councils to gauge long term trends in water quality.

Figure 34 : Water quality results at sites within the NSROC Region 2008-09

Catchment	Locality	Signal
Ryde	Buffalo Ck	2.76
	Terry's Ck	3.26
	Archers Ck	3.05
	Porters Ck	3.46
	Shrimptons Ck	2.41
Willoughby	Swains Ck	3.7
	Flat rock Ck	2.3
	Sailors Bay	2.9
	Scotts Ck	3.3
	Sugarloaf Ck	2.8
	Blue Gum Ck	3.7
Ku-ring-gai	Cowan Ck	4.96
	Gully Ck	3.68
	Wildflower Garden	3.98
Lane Cove	Gore Ck	3.8
	Stringybark Ck	2.7
Hornsby Shire	Hornsby Ck	NA
	Smugglers Ck	NA
	Colah Ck	NA
	Terrys Ck	NA
Hunter's Hill	Tarban creek	2.81
North Sydney	Berry Ck	3
	Quarry Ck	2.75

CATCHMENT MANAGEMENT

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

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

Condition of the NSROC Catchments

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

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

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

Figure 35: Compliance by per cent of pollution at NSROC Beaches in 2008-09

Season	Faecal coliform seasonal compliance	Enterococci seasonal compliance	Site name	Area / waterway
Summer	100	100	Tambourine Bay	Lower Lane Cove River
Winter	100	83	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	91	Woolwich Baths	Lower Lane Cove River
Summer	100	100	Greenwich Baths	Lower Parramatta River
Winter	100	91	Greenwich Baths	Lower Parramatta River
Summer	100	100	Northbridge Baths	Middle Harbour
Winter	100	78	Northbridge Baths	Middle Harbour
Summer	61	65	Hayes Street Beach	Port Jackson
Winter	100	100	Hayes Street Beach	Port Jackson

Note: Source DECCW Beachwatch 2009. Winter season is May 2008 to September 2008, Summer season is October 2008 to April 2009. Compliance is percentage compliance with Beachwatch swimming water quality guidelines.

Improving Catchment Management

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

A number of NSROC councils participated in the International Council for Local Environment Initiatives (ICLEI) water campaign which provided strategic directions for improved water quality and conservation. Management plans identifying actions that to improve catchment water quality as well as reduce the effects of urban runoff were developed as part of this campaign. Following Federal Government funding cuts the ICLEI Water Campaign has been put on hold.

In 2008/2009 **Hornsby Shire Council** continued to monitor and manage the cleaning of existing and new stormwater improvement assets, general upgrades and repairs and associated maintenance (e.g. bush regeneration) of surrounding areas as an ongoing function of the catchment remediation program. Council conducted 70 metres of creek remediation and stabilisation works on Tedbury Creek in Pennant Hills. The NSW Coastal Conference Award 2008 for Local Government was won by Hornsby Council for the implementation of the Berowra Creek Estuary Management Plan. Council also won the Stormwater Industries Association award for Excellence in Stormwater Software Development for a stormwater harvesting model. Catchment education occurred via community catchment tours, displays at festivals and visits to schools.

Ku-ring-gai Council runs a number of catchment-management programs throughout its LGA. Projects undertaken this year include the remediation of creeks and degraded stormwater outfalls, aimed at reducing the impact on natural areas from water-borne pollutants such as sediments, litter and nutrients. In addition, stormwater quality improvement projects including installation of gross pollutant traps and filtration gardens as part of the stormwater harvesting program have been implemented during the year.

Willoughby City Council has continued implementing the recommendations of the CMA catchment action plan which has included a number of riparian restoration works in the Middle Harbour and Lane Cove catchments. The council

has also undertaken community education through its street-to-creeks program to raise community awareness and understanding of the pressures on its waterways, and how the community can help improve the condition of its catchments. In the past year the ongoing drain stencilling program has been undertaken in the Middle Harbour Catchment and Scotts Creek catchment area.

City of Ryde is updating its water sensitive urban design policy and standards and is facilitating on-ground initiatives throughout the local government area. Ryde has installed an innovative bio-retention 'rain garden' system in Meadowbank Park and uses vegetation and soil to treat stormwater runoff by filtering out nutrients and pollutants before the water is released into the Parramatta River. The system measures approximately 30m long and 10m wide, and has been densely planted with native plants and will form a natural barrier between the dog walking area, the hockey field and the park fence-line. The rain garden will also be used as a community demonstration and education site and is another example of how the City of Ryde continues to work towards improving sustainability of our natural water cycle. Two more bio-retention system projects are proposed next year.

Lane Cove Council has installed a bio-retention rain garden system at Tambourine Bay Road, which uses vegetation and sediments to treat the stormwater runoff from the roadway so that fewer pollutants enter the creek, bay and river. The rain gardens are planted out with local indigenous plants.

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

Hunter's Hill Council is a member of the Parramatta River Catchment Group, which was formed to lead efforts to improve the River's condition and ecological function, as well as those of its tributaries and catchment lands. The group addresses natural resource management issues such as biodiversity corridors, weed and pest management, water quality and stormwater infrastructure.

The council has several sediment control structures, particularly in the Tarban Creek catchment. The ponds have been cleaned out and analysis completed on the material removed. Sydney Water has been involved in addressing issues of concern.

North Sydney Council implemented water saving initiatives including the Water Campaign, Every Drop Counts and NSC's Water Savings Action Plan. Outputs included rainwater tanks and other water saving devices installed at Crows Nest Community Centre and Cammeray Park amenities block. North Sydney Council distributed our Education Kit for local Primary schools with activities on waste management and water quality, and also ran gross pollutant trap excursions where students observed litter traps being cleaned. North Sydney Council also worked with the Observatory Hill education centre to run Grime Scene investigations with local schools and ran walk and talk sessions with residents.

CASE STUDY

RYDE, HORNSBY AND HUNTER'S HILL COUNCIL – Catchment Connections

Catchment Connections is a three year NSW Environmental Trust-funded project run in partnership with City of Ryde, Hornsby Shire and Hunter's Hill councils. The project extends over 2,000 hectares (20 km2) across the Terrys Creek, Mars Creek, Shrimptons Creek and Buffalo Creek catchments – which are all tributaries of the Lane Cove River.

Catchment Connections aims to improve the water quality of local creeks, preserve and enhance remnant bushland areas, improve local biodiversity and increase community involvement in Bushcare activities.

The project features an exciting community education and engagement program to reconnect the local community with their catchment. It is complemented by on-ground bush regeneration works and construction of a water sensitive urban design (WSUD) demonstration site. An illustration showing how the local environment and our catchments are interconnected, based on the Eastwood Canal art mural *(Copyright Hotbed Designs)*

STORMWATER MANAGEMENT

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

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

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

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

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

- **Ku-ring-gai Council** is made up of Cowan, Lane Cove and Middle Harbour catchments with urban development located along a ridge at the top of the catchments. The urban areas are surrounded by three national parks downstream which are directly impacted by any stormwater leaving the urban areas. Because of the distinct character of its LGA, the council has integrated controls to address both stormwater quality and quantity into all levels of planning and management to mitigate adverse impacts on the surrounding catchments and bushland.
- **Hunter's Hill Council** stormwater issues essentially involve the effects of discharges directly into the Lane Cove and Parramatta Rivers, both in terms of water quality and the possible detrimental effects of scouring and similar issues. A major issue for Council is the effects of sewer overflows within the Tarban Creek catchment. Sydney Water has been involved with various on-going monitoring and problem solving processes.
- **Lane Cove Council** undertook a project in its largest sub-catchment to improve water flow to Stringybark Creek and the Lane Cove River. Funded by the council the project involved weed and sediment removal and rock armouring a section of badly silted creek bank to reduce stream erosion and localised flooding.
- **North Sydney Council** is currently reviewing its Water Quality Monitoring program to better measure water quality including the effectiveness of GPTs and the stormwater reuse project in improving local water quality. This information will be valuable in supporting further stormwater reuse projects within the local government area.
- **City of Ryde** again tested the water chemistry and macro-invertebrates at five core local creek monitoring locations in spring and autumn months this year. Now into its sixth year, the water quality monitoring program indicates that the impaired macro-invertebrate results reflect findings that would be expected for typically impacted urban streams. This may also be due to regular delivery of pollutants and altered geomorphic conditions due to this connectivity. This year also saw the expansion of water quality testing to eight additional locations to monitor any improvements in water quality after implementation of stormwater improvement capital works. Data and analysis over the six years of the program is being used to help inform creek remediation and restoration works and associated capital works in Ryde.
- **Willoughby** has experienced unprecedented growth in medium- to high-density development in the past 20 years. This is also placing an extraordinary strain on the council's ageing infrastructure, causing a rise in localised flooding and severe degradation of local streams and estuaries. The council is carrying out mitigation projects and implementing strategies to improve water quality, restore riparian habitat, rehabilitate both natural and built drainage systems and protect properties from flooding.

CASE STUDY

WILLOUGHBY COUNCIL – Rotary War Memorial Athletics Field, Lane Cove North Project

During the construction of the Lane Cove Tunnel, an opportunity was recognised to intercept and temporarily store treated water from the tunnel's water treatment plant for irrigation purposes at the adjacent athletics field. Council completed the construction of this stormwater harvesting system in August 2008.

Lane Cove Tunnel treatment plant produces well in excess of the volume required to irrigate the field. The surplus water discharges into a mini wetland adjacent to Epping Road before spilling over into the Lane Cove River. The mini wetland is also used to treat stormwater runoff from Epping and Mowbray Roads and has quickly become habitat for dragonflies and ducklings.

The field has an area of 17,000 square metres, or 1.7 hectares and is used for athletics carnivals by local schools, NSW Athletics Club junior and senior carnivals, small social exercise groups and Olympic athletes for training. The average daily use of this field has always been high and that figure is steadily increasing.

The new harvesting system provides 100 per cent of the water required to irrigate the athletics field. This is a reduction of 4.5 Megalitres per year of Willoughby's potable water demand. The system has also allowed Council to stagger the irrigation cycles and increase the volume of water being used on the field during dryer periods to improve the condition of the tracks.

- In 2008/9, **Hornsby Shire Council's** Water Catchments Team continued long term health monitoring of streams and estuaries. The calculation method for the target indicator changed this year to better reflect the concentration of monitoring at impacted sites. The measured ratings for 2008/9 were "Good" at 47% of sites and "Poor" at 53% of sites. Increasing population and urbanisation increases water contamination pressures, versus ongoing and more effective environmental education and stormwater remediation technologies which result in improved water quality. The calculated water quality ratings are very dependent on chosen sampling sites. Poor ratings predominantly occur as a result of excessive nitrogen nutrient arising from large volumes of sewage treatment plant discharges into Berowra and Calna Creeks, or occur at sites close downstream of intense urban or rural activities. Sites with "Good" ratings are located in areas of the least human disturbance, are far downstream of land development or in estuary areas strongly flushed by tides.

Responding to Stormwater Issues

Each council within the NSROC region has acknowledged future problems that could be associated with the existing stormwater system. However, none are confident that their future capacity to raise revenue would provide them with the funding needed to overcome the on-going pressure on the existing stormwater system to handle larger flows resulting from population growth. The NSROC councils are investing in a number of strategies to deal with stormwater issues, including:

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

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

Hunter's Hill Council has adopted a 10 year stormwater improvement program. The program includes funding specifically for the treatment of stormwater outlets, which open into the Lane Cove and Parramatta Rivers. All works that involve modifications to stormwater systems at the rivers will include some form of treatment to improve discharge water quality. The reconstruction of the Clarkes Point Reserve carpark included the use of filtration through garden beds and a CDS unit to remove gross pollutants. Monitoring of discharges outlets is carried out in autumn and spring. Macro-invertebrate populations are used to indicate the quality of the discharge. Particular emphasis will be given to preventing scour of outlet locations and the protection of waterways from weed infestation.

Lane Cove Council completed an audit of its stormwater network in 2008/09. There were two main parts to the audit. The first was to physically locate and survey the network so it can be accurately represented on the GIS. Secondly, a condition assessment of the system was undertaken for inclusion into Council's asset management system. This information will be used to establish a long term maintenance and upgrade program the system.

The principal objective of installing stormwater treatment measures is to improve the quality of stormwater entering **Hornsby Shire's** waterways by removing pollutants and in some instances retaining stormwater flows. In 2008/09, eleven (11) catchments remediation capital works projects were initiated and completed. These works involved the construction and/or installation of two end-of-pipe bioretention systems, five stream remediation/waterways stabilisation projects, one in-line gross pollutant trap, two streetscape rain gardens, four bioretention tree pits and one large stormwater harvesting and reuse project.

North Sydney Council continued with 4 key initiatives:

- *Stormwater Reuse Project*: The project aims to save 90 ML of potable water a year by harvesting, treating and reusing stormwater for irrigation of sports fields and recreational parks. The St Leonards Park and Cammeray Park stages are completed. Three further stages are in progress.
- *Community education*: NSC developed and released Sustainability Education Kits for local primary schools with activities on waste management and water quality. It also ran gross pollutant trap excursions where students observed litter traps being cleaned, and students were encouraged to take actions to reduce the amount of litter in their school grounds.
- *Water saving initiatives*: NSC has participated in and implemented water saving initiatives including the Water Campaign, Every Drop Counts and North Sydney Council's Water Savings Action Plan. Outcomes included the installation of rainwater tanks and other water saving devices at several Council facilities.

- *Stormwater Quality Improvement Device maintenance*: NSC continued to maintain SQIDs throughout the catchment, reducing the amount of litter entering the harbour.
- *Street Sweeper Program*: NSC has acquired new, smaller street sweepers that allow for mechanical sweeping of footpaths and plazas in business areas, resulting in more litter being removed from the stormwater system.

City of Ryde is focussed on reducing stormwater pollution and increasing water quality through a variety of catchment and asset projects. Projects completed or substantially commenced this year have included creek rehabilitation works at Archers Creek, Shrimpton's Creek and Strangers Creek, stormwater treatment measures at Meadowbank, Looking Glass Bay and Parry Parks and stormwater harvesting and reuse systems at Meadowbank Park, Ryde Park and North Ryde Library. Other creek rehabilitation and bio-retention systems at Santa Rosa Park on Shrimptons Creek and the provision of a stormwater quality improvement device and constructed wetlands on Buffalo Creek are other examples of projects undertaken by City of Ryde to better manage the local stormwater catchment.

Ku-ring-gai Council has 138 pit insert traps and 65 other miscellaneous GPTs that will be incorporated into the maintenance tender. This consolidation of maintenance will allow performance and efficiency to be more accurately quantified and monitored. Ku-ring-gai Council is currently tendering a project to consolidate the maintenance of Gross Pollutant Trap (GPT) devices.

In addition to gross pollutant trap devices Ku-ring-gai has been undertaking retrofit of water sensitive urban design (WSUD) features to decrease diffuse pollutants in stormwater as part of the catchment management program. In 08/09 a filter garden in Kooloona crescent was completed, a sediment detention basin installed at Canoon Rd Netball Courts and outlet protection was established on a stormwater outlet on the Darri track. To date WSUD features installed in Ku-ring-gai include 10 filter gardens, five stormwater harvesting systems and one road retrofit with vegetated filter swales.

Willoughby City Council is continuing to carry out a number of mitigation projects and implement strategies to improve water quality, restore riparian habitat, rehabilitate both natural and built drainage systems and protect properties from flooding. This has been necessary due to an unprecedented growth in medium to high density development in Willoughby over the past 20 years.

These projects and strategies included:

- Major rock armouring and revegetation works in the lower reaches of local watercourses.
- Continuing to encourage developers to install large rainwater tanks to reduce the total volume of stormwater discharging into local drainage systems and bushland.
- Continuing a systematic program of cleaning, assessing and upgrading existing drainage infrastructure to improve the carrying capacity and mitigate nuisance flooding.
- Installing harvesting systems for sports field irrigation to reduce total stormwater discharge volumes as well as to reduce Council's potable water demand.

Figure 36: Performance and expenditure relating to gross pollutant traps in the NSROC region in 2008-09

Council	Gross Pollutant Traps (GPTs) per area	Tonnage waste removed from GPTs	Cost of GPT construction ($)	Cost of GPT maintenance ($)
North Sydney	26	267	0	44,449
Lane Cove	5	26	0	18 925
Hunter's Hill	31	2.5	0	25,000
Ryde	28	209	90,000	56,000
Ku-ring-gai	203	25	0	13,200
Hornsby Shire	380	1235	780,000	460,000
Willoughby	6	60	0	17,013
NSROC region 2008-09	679	1824.5	870,000	615,662
NSROC Region 2007-08	595	2267	1,207,000	603,766
NSROC Region 2006-07	584	1,926	775,000	496,664

CASE STUDY

KU-RING-GAI COUNCIL – Stormwater Harvesting Project

In the 2008-09 financial year, Council completed three stormwater harvesting systems. These are located at Comenarra playing field Turramurra, Lindfield Soldiers Memorial Park Lindfield and at Cliff Oval Wahroonga. The construction of these systems brings the total number of schemes implemented to date to five. The five systems have a combined storage capacity of close to 1,500kL and have the potential to reuse up to 15ML of stormwater for irrigation per year. These systems are implemented as part of an overall Catchment Management program with an emphasis on Water Sensitive Urban Design principles that also includes treatment systems for road runoff at source and remediation of stormwater outfalls.

Any stormwater that is to be used for irrigation will need some form of treatment. The level will depend on the intended use, existing quality and relevant government guidelines. To date Ku-ring-gai Council has relied on both traditional and newer stormwater treatment techniques to manage stormwater quality coupled with access control to manage risk to public health. Ku-ring-gai Council is monitoring the quality of harvested stormwater to determine concentrations of key contaminants with a particular focus on managing the risk to public health. In time this may result in retrofitting additional treatment.

Each of the five projects completed have a different type of treatment and water storage system.

Barra Brui sports field – St Ives, NSW
Storage size: 250m^3
Storage type: Below ground unlined corrugated steel tank
Pre-treatment of stormwater: Trash rack followed by extended detention through a small wetland
Irrigation System and strategy: Fully automatic sprinkler system. Irrigation when low risk of people entering the field.

Edenborough sports field – Lindfield, NSW
Storage size: 310m^3
Storage type: Unlined semi buried above ground concrete tanks (Two tanks of 155m^3)
Pre-treatment of stormwater: Litter basket followed by a passive vegetated sandfilter
Irrigation System and strategy: Quick coupling valves to be used in conjunction with traveling irrigator. System to be upgraded to fully automatic sprinkler system in 2010. Irrigation when low risk of people entering the field.

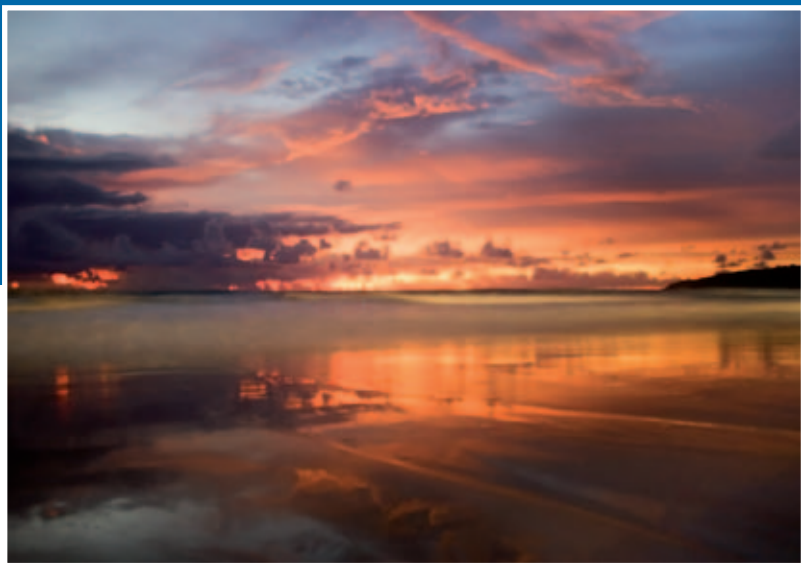
Lindfield Soldiers Memorial Park (Tryon 2) sports field – Lindfield, NSW
Storage size: 500m^3
Storage type: Above ground lined corrugated steel tanks (2 off 250m^3).
Pre-treatment of stormwater: Gross Pollutant Trap, CDS type
Irrigation System and strategy: Subsoil irrigation. No limitations to irrigation times and low risk to human health.

Comenarra playing field – Turramurra, NSW
Storage size: 250m^3
Storage type: Below ground concrete tank.
Pre-treatment of stormwater: Gross pollutant separation followed by biofiltration through vegetated bioretention system
Irrigation System and strategy: Fully automatic sprinkler system (proposed). Irrigation when low risk of people entering the field.

Cliff Oval – Wahroonga, NSW
Storage size: 140m^3
Storage type: Below ground lined plastic arch system (Stormtech).
Pre-treatment of stormwater: Pit litter basket and geofabric filtration within storage system using an 'isolation row'.
Irrigation System and strategy: Fully automatic sprinkler system. Irrigation when low risk of people entering the field.

5 Atmosphere

Atmosphere



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

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

CLIMATE CHANGE

There is a widespread acceptance that climate change is occurring and being affected by greenhouse gas emissions, and that this process is set to continue. Australia has now ratified the Kyoto Treaty on greenhouse gases, and state and local governments, working with their local communities, are working to try and reduce greenhouse gas emissions through educational programs and the introduction of energy conservation measures.

The latest analysis published by the Federal Department of Climate Change suggests the following projected impacts for NSW:

Figure 37: Statewide projected impacts of Climate Change

PROJECTED IMPACTS OF CLIMATE CHANGE IN NSW

- New South Wales is expected to become warmer with more hot days and less cold nights.
- By 2030 the annual average number of days over 35°C in Sydney could grow from the current 3 to 4-7 days, in Canberra from 5 to 6-12 days and in Cobar from 41 to 45-65 days.
- Growth in peak summer energy demand is likely, due to air-conditioning use, which may increase the risk of blackouts.
- Warmer temperatures and population growth are likely to cause a rise in heat-related illness and death for those over 65; increasing in Canberra from the current 14 deaths annually to 37-41 by 2020 and 62-92 by 2050. In Sydney increases are projected in annual deaths from the current 176 to 364-417 by 2020 and 717-1,312 by 2050.
- Warmer conditions may also help spread vector-borne, water-borne and food-borne disease further south. These health issues could increase pressure on medical and hospital services.
- Urban water security may be threatened by projected increases in demand and climate-driven reductions in water supply.
- Little change in annual rainfall and higher evaporation would likely lead to less runoff in rivers in many catchments by 2030. Run-off across the Murray-Darling Basin may decrease 10-25 percent by 2050.
- More frequent and severe droughts, with greater fire risk, are likely.
- By 2020 the annual number of days with very high or extreme fire danger could average 13-14 in Richmond (now 11.5), 26-29 in Canberra (now 23) and 53-57 in Wagga Wagga (now 50).
- By 2020 a 10-40 percent reduction in snow cover is likely with potentially significant consequences for alpine tourism and ecosystems.
- Some agricultural crops may benefit from higher CO2 concentrations however protein content is likely to decline.
- Frost-sensitive crops, such as wheat, may respond well to some warming however more hot days and less rainfall may reduce yields.
- Adverse effects for agriculture include reduced stone fruit yields in warmer winters, livestock stress and an increased prevalence of plant diseases, weeds and pests.
- CO2 benefits experienced by forestry may be offset by a decline in rainfall, more bushfires and changes in pests. Centres dependent upon agriculture and forestry may be adversely affected.
- Increases in extreme storm events are expected to cause more flash flooding affecting industry and infrastructure, including water, sewerage and stormwater, transport and communications, and may challenge emergency services.
- In coastal areas infrastructure is vulnerable to sea level rise and inundation.

Source: Federal Department of Climate Change Website – www.climatechange.gov.au/climate-change/impacts/national-impacts/nsw-impacts.aspx

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

Therefore, the fundamental challenge for local government bodies is to help their communities reduce their energy dependency while at the same time identify activities which will offset emissions and ameliorate negative impacts of climate change. The NSROC's growing population and associated urban consolidation is likely to generate higher greenhouse gas emissions because of:

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

An important development in this area is the Federal Government's intention to start a carbon-trading scheme in 2010/2011. This is likely to have an enormous impact on emissions generally, although the real impact on councils and their operations is not yet known.

The introduction of the energy conservation opportunities proposed in schemes like the state government's BASIX code should eventually show a positive impact. But the extent is limited to new housing stock and renovated homes which represent a small proportion of total housing stock. This will not be as fast in the NSROC region as it will be in new greenfield development areas.

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

Greenhouse Gas Emissions in the NSROC Region

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

Figure 38: Greenhouse emissions and reduction through council action in the region for the year 2008-09

Council	Tonnes of Co^2 created by council for top three sites	Tonnes of Co^2 saved through projects for all council assets	Tonnes of Co^2 saved by council run community projects
North Sydney[1]	3,168	5,917	N/A
Lane Cove	1,782	1,236	632
Hunter's Hill	203	37	N/A
Ryde[3]	562	1,111	36, 019
Ku-ring-gai[2]	1,215	200	702
Hornsby Shire[4]	1,749	3,092	47,407
Willoughby	2,199	2,626	36.3
Total for NSROC	10,878	14,219	N/A

Notes

1. North Sydney Council figures for community emission reductions – these are difficult to quantify accurately as emissions can only be estimated and initiatives to reduce them come from all levels of government.
2. Kur-ring-gai Council has used specific and readily available data for these results. Tonnes of CO2 saved by council run community projects have been calculated from Ku-ring-gai's Fridge Buyback program. Council's GreenStyle program has not been included in this dataset as accurate data is not yet available.
3. Ryde Council figures were verified through the Milestone 5 Inventory Report completed November 2008 and further estimation of savings from compilation of corporate and community works implemented by Council to 30 June 2009.

   The figure of 36,019 eCO2t is the cumulative tonnes saved from Council community programs since 2007-2009 inclusive.
4. Hornsby Shire Council figures for community emission reductions only include programs that are run by Council. This figure does however include CO2 saved from Council's waste collection and disposal activities. Council's GreenStyle program has not been included in this data set as accurate data is not yet available.

Responding to Greenhouse Emissions

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

In 2007-08 SOE Report NSROC identified various actions to assist councils develop their climate change responses. Many of these initiatives have been pursued. The most significant being the creation of the NSROC Sustainability Plan. The plan's objectives noted in Chapter 1 specifically look at climate change and propose particular Climate Change Goals and Actions as per Figure 39:

Figure 39: NSROC Regional Sustainability Plan 2009-2014 – Climate Change Goals and Actions

Regional Five Year Goals	Indicators and Targets	Regional Programs / Actions
Reduce Energy Consumption		
1. Reduce use of non-renewable energy Inform and enable households, communities, businesses, schools and other organisations overall in the Region to reduce consumption of non renewable energy	• Trends in energy consumption per household, business, school and organisation • Support sustainability audits for the community • No of households, businesses, schools and other organisations participating in energy conservation programs	• Enable each household, business, school and organisation to be aware of their GHG footprints • Collaborative and coordinated media awareness and learning-for-action campaigns • Make sustainability actions easier for the community to understand and adopt e.g. solar hot water and green power
Reduce GHG Emissions (Mitigation)		
2. Reduce emissions by Councils Each Council has developed a clear corporate GHG emissions reduction strategy and targets, monitored and reported on regularly. Corporate strategies include improving the energy and fuel efficiency of council operations	• Corporate GHG reduction targets and dates planned • Corporate GHG reduction plans monitored and reported to community • Fleet fuel consumption rates • % hybrids in fleet	• All Councils to adopt Climate Change Adaptation Plans • Assist Councils in developing Energy Savings Action Plans • Continue to reduce GHG emissions from Council vehicle fleet by utilising fuel efficient vehicles, share/pool cars and alternative fuel technologies • Continue to collectively lobby major utilities to provide Councils with regional data and efficient products • Continue to implement the energy efficient, Region-wide Street Lighting Improvement Program (SLIP)
3. Reduce emissions by the Community Facilitate the reduction of community emissions through education and advocacy	• Regularly audited regional community GHG footprint reported to the community • % of CO2 community reductions achieved • Agreed minimum regional targets of 30% reduction by 2020 and 60% reduction by 2050 based on year 2000 baseline (or equivalent)	• Develop robust science to determine what are the actual emissions of the Region • Deploy innovative and accurate software to calculate corporate and community emissions • Lobby State Government and utilities to facilitate data access for community reporting
Adapt to Climate Change (Adaptation)		
4. Plan to adapt to climate change Ensure all Councils and other key organisations in the Region understand the national Carbon Pollution Reduction (CPR) Scheme and are well positioned for eventual legislation.	• CPR understanding is addressed in corporate plans • NSROC acknowledged by LGSA as a climate change action leader	• Conduct training for relevant Council staff and offer training to key organisations.

Most significantly, all NSROC councils have adopted carbon-emission targets for their own activities and those of their communities. Many targets have evolved out of participation in the CCP program and are matched by a variety of council actions to ensure progress is made towards achieving the targets in the desired timeframe. A core problem for councils is how to measure emission accurately and also how to achieve significant reductions once the first wave of efficiency measures have been implemented. Nevertheless, carbon-emission reduction remains one of the most important objectives of all NSROC councils, and this is only likely to increase when the national carbon emissions trading scheme is implemented.

Figure 40: NSROC Carbon Emission Reduction Targets

Council	Date adopted	Target for council	Date to be achieved	Target for community	Date to be achieved
Willoughby[1]	2000	50%	1999 – 2010	30%	1995 – 2015
Ryde	2007	30%	003/04 – 2012	20%	2001 – 2010
Hunter's Hill	2007	20%	2010	100%	2010
		50%	2025	30%	2025
		100%	2050	60%	2050
Lane Cove	2007	50%	2001 – 2017	50%	2017
North Sydney	2001	50%	1996 – 2010	25%	1996 – 2010
Hornsby[3]	2006	35%	1996 – 2012	5%	2010
	2006	60%	1996 – 2050	10%	2050
Ku-ring-gai[2]	2000	20%	1996 – 2010	10%	2011

Notes

1. Willoughby also has a community target of a 15% reduction by 2015 based on 2007 levels.
2. The Ku-ring-gai data above is based on the 2008/09 year. As of October 2009 Ku-ring-gai Council adopted a new Climate Change Policy. New carbon emission reduction targets for Council include 20% by 2020 and 90% by 2050.
3. The Hornsby Shire data above is based on a reduction of 5% of 1995/96 emission levels by 2010 and 10% of 1995/96 emission levels by 2012.

Individual NSROC councils have shown considerable commitment to responding to climate change and reducing their greenhouse gas emissions.

As a step towards achieving **Ku-ring-gai Council's** corporate greenhouse reduction goal of 20 per cent by 2010, $233,800 has been invested in energy and water conservation upgrades as part of an energy performance contract. The projects target ten Council facilities and have included lighting upgrades, lighting timer installations, zip boil heater timers, air conditioning and heating upgrades, building-management system installations, air conditioning timers, smart water meters and automated lighting controls. In addition to this project, Council has reduced energy consumption at its Wildflower Garden by 99%! Together these projects have achieved a 191 tonne (6%) reduction in CO2 emissions, taking Council's facility emissions back to 2000 levels.

Lane Cove Council has long been aware of the need to reduce the carbon intensity of its own facilities and of its community. As a member of the ICLEI Cities for Climate Protection Program, Council adopted an ambitious target of a 50% reduction in carbon emissions on 2000/01 levels by 2017. To provide a framework for Council to achieve this target, Council is developing an Alternative Energy Roadmap that will provide a technological and financial feasibility assessment of initiatives available to Council to meet its carbon emission reduction target.

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

North Sydney Council key mitigation activities undertaken to date include implementation of Council's Energy Saving Action Plan including installation of photovoltaics, solar hot water, heat pumps, energy efficient lighting, timers, motion sensors, HVAC upgrades and alike at council properties. In additional North Sydney Council has also implemented an alternative waste technology contract (recycling up to 80% of waste), fuel efficient and hydrid fleet vehicles and a range of initiatives with businesses (NABERS energy ratings, free/low cost energy audits and action plans, low cost installation of energy saving measures), schools (support to implement solar schools grants) and residents (North Sydney Climate Challenge, free workshops and low cost sustainability technologies).

CASE STUDY

HORNSBY SHIRE COUNCIL – Climate Change Adaptation Strategic Plan

In 2007 Hornsby Shire Council partnered with the International Council for Local Environmental Initiatives (ICLEI) to pilot a program to be delivered to councils across Australia on climate change adaptation. This project coincided with the work undertaken by the Sydney Coastal Council's Group and the CSIRO on climate change vulnerability mapping. From the available information and involvement in the program with ICLEI Council developed 5 issues briefs for extreme heat and health effects, bushfires, accelerated ecosystem loss, extreme storm events and sea level rise. The production of the issues briefs has aided the development of a draft Climate Change Adaptation Strategic Plan.

The Climate Change Adaptation Strategic Plan (CCASP) (the 'Plan') focuses on five key impact areas identified as relevant for Hornsby Shire including: heat, bushfires, ecosystems, rainfall and sea level rise. The Plan identifies and quantifies potential climate change impacts on the natural and built environments of the Shire. Highly vulnerable attributes such as people, properties and infrastructure have been identified and subsequently a climate change risk assessment has been conducted. The risk assessment process was specially tailored to suit climate change impacts and was inclusive of a sustainability assessment. This step allows Council to optimise allocation of resources for effective and efficient implementation of adaptation actions.

The top 12 impacts and associated actions have been assessed to have level 'A' priority ranking, indicating that the actions are an 'extreme' priority. The level 'A' ranking also indicates that the action

is expected to yield highly sustainable outcomes. It should be noted that each of the top 12 impacts and associated actions has equal weighting and is not ranked within the level 'A' prioritisation.

The preparation of the Plan is consistent the requirements of Council's Sustainable Energy Strategy 2006-2010. The Plan provides Council with strategic direction for the identification and management of potential climate change impacts on the natural and built environments within the Shire.

In 2008-09 **City of Ryde's** commitment to a sustainable future through greenhouse gas emission reduction was recognised with notification from the International Council for Local Environmental Initiatives that Council had successfully completing Milestone 5 of the Cities for Climate Protection Program (CCP)™. Council has achieved significant energy savings from a range of initiatives including numerous climate change educational campaigns and the implementation of internal Environmental Monitoring Systems and sustainable transport initiatives. City of Ryde actively promotes the Fridge Buy Back program which has seen 440 working second fridges collected since the start of the program equating to $620,000 in savings to residents on energy costs alone and the removal of 3600 tonnes of carbon dioxide from the atmosphere. City of Ryde has also recently developed the Sustainability Product Information Kits for ceiling insulation, solar panels, rainwater tanks and solar hot water systems. These kits have simple to follow installation checklists for residents on how to receive rebates and the process for lodging a Development Application if required. The kits also have the contact details of City of Ryde preferred suppliers for the installation of these products, many offering discounts for City of Ryde residents.

Willoughby City Council has developed a suite of new programs to reduce Council's carbon footprint and assist the community to respond to climate change. To help communicate this new direction, Council launched the *ClimateClever* community education campaign. *ClimateClever* includes a range of programs to assist the community to respond to climate change including a free home and school assessment program.

Council is demonstrating its leadership in reducing its own carbon footprint by committing to a reduction target of at least 50 per cent below the 1999 levels by 2010. During 2008/2009 financial year, with the help of the new e.restore 3 levy, Council has undertaken a number of projects in the areas of energy conservation, efficiency, renewable energy technology, offsetting and GreenPower. One such project incorporated the installation of 20 kilowatts of photovoltaic panels on the roof of the new Council depot building. Council is also a member of and promotes specialised business programs such as Sustainability Advantage and CitySwitch Green Office which both assist local businesses to reduce their energy consumption and greenhouse gas emissions.

Hornsby Shire Council has continued to implement actions contained within its Sustainable Energy Strategy in 2008/09. These have included the following:

- installation of a wind turbine at Berowra;
- HVAC Predictive Maintenance program for Council's libraries;
- improvements to Hornsby Library's Cogeneration System;
- commenced an audit of Council's Energy Performance Contracts;
- investigated options for carbon neutrality;
- commenced a re-inventory of Council CO2 emissions by reviewing several data management software options;
- continued to implement actions arising from the Sustainable Fleet Management Study; and
- re-establishment of the Sustainable Procurement Committee.

AIR QUALITY

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

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

Air Quality in the Region

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

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

The key air quality and health issue in the NSROC region is traffic related air pollution. Air pollution measurement across NSROC region is not comprehensive with only one permanent state-funded regional air quality monitoring station in the NSROC region. Furthermore the links between pollution levels and community health are subject to debate and continuous research. Nevertheless NSROC councils recognise this is a community concern and maintain awareness of pollutant levels.

Air quality has improved significantly in the past 20 years, with reductions in carbon monoxide, nitrogen dioxide, sulphur dioxide and lead. Of the six key air pollutants included under the National Environment Protection Measure for Ambient Air Quality (Air NEPM), only two – photochemical smog (as ozone) and, to a lesser extent, fine particles (as PM10) – remain significant issues in NSW. (*DECCW – Current and Projected Air Quality in NSW – 2007*)

The NSROC has a strong interest in ensuring that a significant population increase in its region does not lead to overall air quality deterioration. Its major difficulty is that its councils have limited influence over problems of this type because when they occur, they are rarely limited to a single part of Sydney. Episodes where the air quality is poor are

CASE STUDY

NORTH SYDNEY COUNCIL – Climate Challenge

North Sydney Council, in partnership with the Nature Conservation Council of NSW, launched the **North Sydney Climate Challenge** in March 2009. Over a four month period, the Climate Challenge aimed to reduce household and collective greenhouse emissions, facilitate ongoing behaviour change and promote more sustainable communities.

Residents across the LGA signed up to 'take the Climate Challenge' which offered simple, practical ways to reduce greenhouse gas emissions and work together to create ongoing climate solutions.

The free community project was highly subscribed with 551 participating households, representing over 1240 residents – the highest of any LGA to take the Climate Challenge. Armed with a Climate Challenge Passbook filled with energy saving steps, participants awarded themselves stars for taking actions that reduced their carbon footprint at both the household and community level. While all participants made changes, big and small, twenty-two households went on to became "Challenge Champions", which involved earning 35 or more stars in their Passbooks by the Awards Night. Participants were rewarded for their achievements through a range of prizes which were kindly sponsored by the NSW Department of Environment, Climate Change and Water.

Through the combination of an interactive resource package, a series of three local events, and one-on-one participant support, the Climate Challenge successfully encouraged energy efficiency improvements, facilitated behaviour change towards sustainability outcomes, and created a new 'Climate Challenge' community. The Climate Challenge connected residents to climate change solutions, linked local initiatives, built stronger relationships between Council and the community, and received good local media coverage. Furthermore, in bringing people together and sharing successes, the Climate Challenge built social capital by inspiring the North Sydney community to work together, form groups and create ongoing change.

The Climate Challenge abated an average of 4.56 tonnes of CO2 per household surveyed. This will continue to decrease with over 94% of households surveyed stating that they would be taking further actions after the Climate Challenge. Furthermore, a number of new groups were kick-started, such as a North Sydney's first Climate Action Group.

North Sydney residents and Mayor McCaffery celebrate completing the Climate Challenge at the Awards Night, June 2009

more likely to be experienced across a wide area of Sydney, so there are few steps that even groups of councils can take collectively to address causes.

Some key areas are monitored by State Government such as the Lane Cove Tunnel. Carbon monoxide and other pollutants within the tunnel are monitored to ensure compliance, and tunnel owners, Connector Motorways, publishes the hourly real-time monitoring results on its web site. Outside the Tunnel, particulate matter, carbon monoxide, nitrogen oxides and other pollutants are also monitored to ensure compliance. This ambient air quality monitoring occurs around the ventilation stacks at four locations:

- Artarmon Public School, Artarmon
- Hallam Avenue tennis courts, Lane Cove West
- Lane Cove Country Club, Lane Cove
- Magdala Park, North Ryde.

Two additional elevated stations at 401 Pacific Highway, Artarmon and 14–18 Orion Road, Lane Cove West were also operated until March 2008.

The annual air quality reports for the Lane Cove Tunnel show pollutant levels consistently below the limits prescribed by the Minister for Planning over the period August 2008-July 2009. However it should be noted that the Tunnel is only carrying half of it's estimated traffic capacity and pollutant levels are likely to rise should capacity increase.

Responding to Air Quality Issues

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

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

CASE STUDY – UPDATE

WILLOUGHBY COUNCIL – Air Quality Monitoring

The Ambient Air Quality Monitoring Station (AQMS) has been established by Willoughby City Council in the grounds of Mowbray Public School and is now in it its third 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.

The AQMS has been fully operational since January 2006 and equipment is recording ambient air quality data for Nitrogen Dioxide (NO_2), 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 numbers 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 wellbeing 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 National Environment Protection measures for ambient air quality other than PM2.5 are listed in the below figure. At this stage there is no set standard for PM2.5 however it is envisaged that PM2.5 will be set as a criteria pollutant in the future. The analysis of data from the AQMS indicates that the air quality in the vicinity of the monitoring station is generally good. The criteria for NO_2, CO and PM10 is not exceeded for the period between March 2008 and March 2009. The data for the entire period of operation of the AQMS has been examined and generally an overall downward trend in concentrations is evident after the opening of the Lane Cove Tunnel.

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

6 Landscape

The forests, woodlands, grasslands and other vegetated landscapes of New South Wales are important for a healthy environment and society. Native vegetation controls erosion, land degradation and discharge of salinity into rivers, and provides habitat for a wealth of unique flora and fauna. In addition, the vast amount of carbon stored in native vegetation makes a significant contribution to moderating climate change. *(DECCW 2008 – NSW Annual Report on Native Vegetation)*

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

Because of the steep inclines, gullies and undulating terrain of the NSROC region, and the presence of many natural water bodies contiguous to this terrain, the region is particularly vulnerable to accelerated erosion, nutrient run-off, flooding, sedimentation and the associated decrease in water quality. Native bushland has an important ecological role in binding soil matter, maintaining infiltration, absorbing water and greenhouse gas sequestration.

ACID SULFATE SOILS

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

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

The State Government has already completed extensive mapping of acid sulphate soils. More detailed local mapping is still being done by some of the councils in conjunction with the Department of Lands. The NSROC councils have prepared, or are preparing, the appropriate planning instruments to ensure minimal disruption of acid sulphate soils.

SOIL EROSION

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

Erosion in the Region

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

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

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

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

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

CASE STUDY – UPDATE

LANE COVE COUNCIL – Lower Stringybark Creek Erosion Stabilisation Project

The objective of the project was to stabilise the stream bank area surrounding the outlet of a major stormwater drain that discharges into Stringybark Creek. Prior to the project, stream bank erosion surrounding the outlet drain was accelerating and the remaining stream bank was becoming undercut and unstable.

Appropriate engineering erosion controls and bush regeneration methods were implemented to ensure that peak discharges are managed. The creek bank was carefully cut back and stabilised with the interlocking of large sandstone rocks. The creek channel size was increased to allow for large rain events without the threat of flooding adjacent properties.

The project was highly successful. Stabilisation of the stream bank was able to save a number of trees that are threatening to fall due to the undercutting of the bank. With a slight widening of the channel and raising of the bank walls residential properties adjacent are now less prone to the chance of flooding. With the removal of the environmental weeds and the revegetation of the disturbed site, aesthetically the area has improved.

In conjunction with this project, a Gross Pollutant Trap was installed under nearby Elizabeth Parade. All gross pollutants, including organic leaf material, will now be captured and not be flushed into the Stringybark Creek and Lane Cove River. This will contribute to improved water quality and low the nutrient loads being washed in from decomposed leaf litter.

Managing Erosion

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

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

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

Due to a large number of complaints received concerning sediment/soil erosion, a streamlined approach was taken by Hornsby Shire Council introducing a site care report. The report is a simple but effective template that is filled out by

an officer and given as a written directive to the builder or owner of the property being developed. Where the officer re-inspects and the works are not carried out, a fine or notice is then issued. Due to large building sites causing concerns relating to dust, the developer is now required to show evidence of compliance with the Protection of Environment Operations Act 1997 levels for solid particle emissions. This requires the implementation of sampling onsite and further active measures e.g. a management plan, watering of site, vehicles, entry points, carrying out of works depending on meteorological conditions.

LAND CONTAMINATION

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

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

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

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

CASE STUDY

RYDE COUNCIL – Remediation of City of Ryde's Shepherds Bay Site

The metamorphosis of Council's former works depot site at Shepherds Bay is now complete. The site previously hosted light industrial infrastructure and a number of underground fuel storage tanks, but is now one of Ryde's waterfront park showpieces.

SAME VIEW OF SITE FOLLOWING REMEDIATION STORAGE TANK PIT

SITE DURING REMEDIATION, SHOWING UNDERGROUND

Remediation included the removal of localised near-surface contamination, removal of underground storage tanks, and placement of engineered capping to auditor's requirements. The new landscaping includes artworks that reflect the local aboriginal and early European history of the site.

Contaminated Sites in the Region

The number of contaminated land sites in the NSROC region in the 2008-09 reporting period is 10, the same as 2007-08

Figure 41: Number of declared contaminated land sites in the NSROC region in 2008-09

Council	No of Sites
North Sydney	2
Lane Cove	1
Hunter's Hill	2
Ryde	0
Ku-ring-gai	3
Hornsby Shire	0
Willoughby	2
NSROC Total	10

Responding to Land Contamination

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

All councils continually monitor development in relation to contaminated sites. Councils work closely with the DECCW to ensure the contaminated land record is accurate and up-to-date. They also take the following steps to ensure land contamination is managed appropriately by:

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

MAPPING

Various mapping initiatives are being undertaken by State agencies and other organisations, in conjunction with NSROC councils. This in turn will increase the future environmental understanding and monitoring capacity of the region.

Some key initiatives include:

- **Mapping and responding to Coastal Inundation in the Sydney Coastal Councils Group (SSCG) region.** This project recently awarded grant funding under the Natural Disaster Mitigation Program and is in partnership with CSIRO. It will map all areas of risk in the SSCG region which includes NSROC member councils of North Sydney, Willoughby and Hornsby. The project will utilise sophisticated modelling together with Councils' information sources (such as Digital Elevation Models) to determine risk and develop consistent model planning and management responses in consultation with key state agencies and the broader community. There are three stages:

  1. Effect of Climate Change on Sea Level rise and extreme Sea Levels;
  2. Development of Model planning provisions to integrate sea level rise and extreme sea level events;
  3. Develop and distribute community risk disclosure information and a corresponding community and stakeholder education program.

- **Mapping in the Sydney Harbour catchment by the Sydney Metropolitan Catchment Management Authority (SMCMA)** The Sydney Metropolitan Catchment Management Authority in partnership with the Department of Primary Industries, NSW Maritime and the Royal Botanic Gardens have mapped the foreshore and estuarine vegetation (seagrasses, mangroves and saltmarsh) of Sydney Harbour and the freshwater, instream vegetation of the Lane Cove River, Middle Harbour and the Parramatta River. The estuarine vegetation mapping also includes historic distribution data. The freshwater, instream vegetation mapping includes indigenous and exotic species of emergent, floating and submerged aquatic macrophytes.

  These projects have produced a series of GIS databases and scientific reports which are freely available to local councils. The reports are available from the SMCMA website: http://sydney.cma.nsw.gov.au/component/option,com_remository/Itemid,116/func,select/id,29/

  - *An assessment of the saltmarsh of the Parramatta River and Sydney Harbour*
  - *A preliminary assessment of the historical, current and future cover of seagrass in the estuary of the Parramatta River.*
  - *Sydney harbour foreshore vegetation report*
  - *Occurrence of freshwater macrophytes in the catchments of the Parramatta River, Lane Cove River and Middle Harbour Creek, 2007-2008*

In addition, the Sydney Harbour information has been analysed to produce a series of maps, tools and guidelines, developed in consultation with council and agency officers, to assist councils and agencies with measures to protect and enhance these natural resources within Sydney Harbour. The title for these guidelines is *Sydney Harbour Foreshore and Estuarine Vegetation Mapping Guidelines*, and they are also available at the above website address. GIS layers are available from the SMCMA.

CASE STUDY

HUNTER'S HILL COUNCIL – Hunter's Hill Kelly's Bush Tin Slag Management

The Australian Nuclear Science & Technology Organisation (ANSTO) carried out two stages of a comprehensive radiological survey of Nelson Parade, Kelly's Bush and surrounding areas in Hunter's Hill in November and December 2008 and in March 2009 as requested by NSW Department of Health and NSW Department of Environment and Climate Change (DECCW). For the majority of sites surveyed, levels of radioactivity were found to be consistent with natural background levels. Elevated levels were measured at the site of the former Tin Smelter in Kelly's Bush, around the Kelly's Bush foreshore and one section of Weil Park. Elevated levels were also detected from the surface of numerous roads in the area as a result of historical use of waste slag from the former Tin Smelter in the preparation of the roadbase. From the survey results and dose estimates, there is not sufficient justification for the remediation of these sites on radiological safety grounds. This conclusion does not consider non-radiological and social impacts.

NSW Department of Health, NSW DECCW and State Property Authority NSW in a presentation to Hunter's Hill Council reported that key elements of a tin slag management strategy are:

- Kelly's Bush should remain as public open space
- Excavated tin slag (roadworks, utilities, etc) should be disposed to landfill
- Standard dust mitigation measures should be utilised when working with tin slag
- Consider whether land notifications are useful
- Reports should be made available to the community

CASE STUDY

KU-RING-GAI COUNCIL – Threatened Ecological Species Mapping

Ku-ring-gai has continued it vegetation mapping program in 2008-2009. The program has focused on the mapping of Threatened Ecological Communities.

With approximately 95% of the mapping has been completed, council is aiming to release their product in alignment with the release of the Sydney Metropolitan Catchment Management Authority Vegetation mapping (undertaken by DECCW).

Mapping has included field validation of over 8000 remnant, 17000 non-remnant vegetation areas, covering 107,500 cadastral properties. Four new threatened flora sightings have been recorded.

The vegetation mapping methodology was designed by Council staff with early input from state agency representatives from the Department of Environment and Climate Change – National Park and Wildlife Service and Royal Botanic Gardens sections, independent experts and a community advisory group.

Mapping was undertaken based upon the following:

- provision of canopy mapping from DECCW (co-operative assistance between council mapping and the Sydney Metropolitan Catchment Area vegetation mapping projects)
- refinement of areas to be field validated using aerial photo interpretation (API) (2005, 10cm resolution aerial photography) and LiDAR (GIS based height) data
- rapid Field Assessment of all mapped canopy areas greater than 10 meters in height (in order to reduce non-remnant vegetation, e.g. gardens)
- mapping of field assessment results

7 Appendices

Appendices

APPENDIX 1: Daily traffic volumes at key locations in the NSROC region in 2006 and 2008

Road	Location	Average Daily Traffic 2006	Total both directions 2006	Sum 2008 (where available)
Epping Rd, Mr373 – E	Lane Cove, West Of Elizabeth Pde	33,471	71017	Na
Epping Rd, Mr373 – W	Lane Cove, West Of Elizabeth Pde	37,546	–	Na
Epping Rd, Mr373 – E	Lane Cove, West Of Longueville Rd	33,375	71913	Na
Epping Rd, Mr373 – W	Lane Cove, West Of Longueville Rd	38,538	–	Na
Gore Hill Fwy, Mr651-Sl15 – E	Willoughby, North Of Northcote St	38,100	78018	Na
Gore Hill Fwy, Mr651-Sl15 – W	Willoughby, North Of Northcote St	39,918	–	Na
Burns Bay Rd, Mr166 – N	Hunter's Hill At Figtree Bridge	19,403	41690	39182
Burns Bay Rd, Mr166 – S	Hunter's Hill At Figtree Bridge	22,287	–	Na
Pacific Hwy, Sh10 – N	Chatswood, South Of Mr328, Boundary St	30,038	58465	58044
Pacific Hwy, Sh10 – S	Chatswood, South Of Mr328, Boundary St	28,427	–	Na
Pacific Hwy, Sh10 – N	Pymble, South Of Telegraph Rd	29,642	63946	60377
Pacific Hwy, Sh10 – S	Pymble, South Of Telegraph Rd	34,304	–	Na
Pacific Hwy, Sh10 – E	Wahroonga, East Of Sydney-Newcastle Fwy	30,559	58931	55909
Pacific Hwy, Sh10 0 – W	Wahroonga, East Of Sydney-Newcastle Fwy	28,372	–	Na
Pacific Hwy, Sh10 – N	Wahroonga, North Of Sh13, Pennant Hills Rd	17,166	32087	Na
Pacific Hwy, Sh10 0 – S	Wahroonga, North Of Sh13, Pennant Hills Rd	14,921	–	
Pacific Hwy, Sh10 – N	Asquith, South Of Mills Av	7,643	17297	18455
Pacific Hwy, Sh10 – S	Asquith, South Of Mills Av	9,654	–	Na
Pacific Hwy, Sh10 – N	Berowra, 2K North Of Berowra Waters Rd	1,213	2560	2853
Pacific Hwy, Sh10 – S	Berowra, 2K North Of Berowra Waters Rd	1,347	–	Na
Victoria Rd, Mr165-E	Ryde, East Of Belmore St	29,580	56221	55486
Victoria Rd, Mr165 – W	Ryde, East Of Belmore St	26,641	–	Na
Church St, Mr200-Sl2 – N	Ryde, At Ryde Bridge	39,923	83786	Na
Church St, Mr200-Sl2 – S	Ryde, At Ryde Bridge	43,863	Na	Na
Epping Rd, Mr373	East Ryde, West Of Hills Mwy, M2 Terminal	27,424	Na	Na
Epping Rd, Mr373 – E	Epping, At Terrys Creek Bridge	19,720	39503	Na
Epping Rd, Mr373 – W	Epping, At Terrys Creek Bridge	19,783	–	Na
Pennant Hills Rd, Sh13sl1 – N	Pennant Hills At Railway Bridge	38,167	75277	73417
Pennant Hills Rd, Sh13sl1 – S	Pennant Hills At Railway Bridge	37,110	–	Na
Pennant Hls Rd, Sh13-Sl9 – N	West Pennant Hills, South Of Copeland Rd	36,842	73793	Na
Pennant Hls Rd, Sh13-Sl9 – S	West Pennant Hills, South Of Copeland Rd	36,951	–	Na

APPENDIX 2: Aircraft Noise Complaints in NSROC region and adjacent suburbs 2008-2009

Recorded Complaints vs Complainants, by Suburb – 1st July 2008 to 30th June 2009		
Suburb	**Complaints**	**Complainants**
Berowra Heights	1	1
Cammeray	3	3
Carlingford	3	3
Castle Cove	2	1
Castle Hill	7	5
Chatswood	2	2
Chatswood West	10	1
Cremorne	1	1
Crows Nest	2	2
Denistone	1	1
Dural	1	1
East Ryde	25	15
Eastwood	1	1
Epping	4	4
Gladesville	8	8
Glenhaven	1	1
Gordon	1	1
Gore Hill	1	1
Henley	5	5
Hornsby	5	4
Hunter's Hill	1736	41
Huntleys Cove	1	1
Huntleys Point	2	2
Kenthurst	1	1
Killara	5	5
Kirribilli	1	1
Lane Cove	64	23
Lane Cove West	3	1
Lindfield	3	3
Linley Point	1	1
Longueville	1	1
Marsfield	3	2
Meadowbank	7	4
Middle Cove	1	1
Mount Colah	1	1
Naremburn	1	1
Neutral Bay	2	1
North Ryde	32	19
Northbridge	2	1
Pennant Hills	1	1
Pymble	21	5
Riverview	13	2
Roseville	21	6
Ryde	2	2
St Ives	7	3
Tennyson	1	1
Tennyson Point	2	2
Thornleigh	3	2
Turramurra	8	6
Wahroonga	5	5
Waitara	4	3
Warrawee	6	3
West Pennant Hills	1	1
West Pymble	5	4
Westleigh	2	1
Total	**2053**	**218**

APPENDIX 3: List of threatened species in the NSROC region from the Atlas of NSW Wildlife (2009)

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)
E4A – Critically endangered (Threatened Species Conservation Act, 1995)

The Atlas states that 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 Fauna threatened species – total 37 species (8 endangered)		
Scientific Name	**Common Name**	**Legal Status**
Pandion haliaetus	Osprey	**V**
Ixobrychus flavicollis	Black Bittern	**V**
Callocephalon fimbriatum	Gang Gang Cockatoo Population, Hornsby & 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**
Glossopsitta pusilla	Little Lorikeet	**V**
Lathamus discolor	Swift Parrot	**E1**
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**
Dugong dugon	Dugong	**E1**
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**
Chalinolobus dwyeri	Large eared Pipe Bat	**V**
Falsistrellus tasmaniensis	Eastern Dalse Pipstrelle	**V**
Myotis macropus	Southern Myotis	**V**
Dermochelys coriacea	Leathery Turtle	**V**
Varanus rosenbergi	Rosenberg's Goanna	**V**

LGA – Hornsby Flora threatened species (43 species – 17 endangered)		
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	Narrow leaf Finger Fern	**E1**
Haloragis exalata		**V**
Haloragis exalata subsp. exalata		**V**
Pilularia novae-hollandiae	Austral Pillwort	**E1**
Callistemon linearifolius	Netted Bottle Brush	**V**
Darwinia biflora		**V**
Darwinia fascicularis subsp. oligantha	Darwinia fascicularis subsp. oligantha population in the Baulkham Hills and Hornsby Local Government Areas	**E2**
Darwinia peduncularis		**V**
Eucalyptus camfieldii	Heart-leaved Stringybark	**V**
Eucalyptus scoparia	Wallagarra White gum	**E1**
Kunzea rupestris		**V**
Leptospermum deanei		**V**
Melaleuca deanei		**V**
Micromyrtus blakelyi		**V**
Syzygium paniculatum	Magenta Lilly Pilly	**V**
Caladenia tessellata	Thick Lip Spider Orchid	**E1**
Genoplesium baueri	Bauer's Midge Orchid	**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**
Acacia terminalis subsp. terminalis	Sunshine Wattle	**E1**
Haloragodendron lucasii		**E1**
Prostanthera junonis	Somersby Mintbush	**E1**
Eucalyptus nicolli	Narrow leafed Black Peppermint	**V**
Melaleuca bicovexa	Biconvex Paperbark	**V**
Grevillea shirressi		**V**
Genoplesium plumosum	Tallong Midge Orchid	**E4A**
Pterostylis nigricans	Dark Greenwood	**V**

LGA – Hunter's Hill Fauna threatened species – 5 species		
Scientific Name	**Common Name**	**Legal Status**
Ninox connivens	Barking Owl	V
Ninox strenua	Powerful Owl	V
Pseudophryne australis	Red-crowned Toadlet	V
Pteropus poliocephalus	Grey-headed Flying-fox	V
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	V

LGA – Hunter's Hill Flora threatened species – 4 species		
Scientific Name	**Common Name**	**Legal Status**
Darwinia biflora		V
Genoplesium baueri	Bauer's Midge Orchid	V
Eucalyptus nicolli	Narrow leafed Black Peppermint	V
Epacris purpurascens var purpurascens		V

LGA – Hornsby Flora threatened species (43 species – 17 endangered)		
Scientific Name	**Common Name**	**Legal Status**
Nettapus coromandelianus	Cotton Pygmy-Goose	E1
Botaurus poiciloptilus	Australasian Bittern	V
Callocephalon fimbriatum	Gang Gang Cockatoo Population, Hornsby & 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
Glossopsitta Pusilla	Little Lorikeet	V

LGA – Ku-ring-gai Flora threatened species – 18 species – 8 endangered		
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**
Leptospermuim deanei		**V**
Genoplesium plumosum	Tallong Midge Orchid	**E4A**
Genoplesium baueri	Bauer's Midge Orchid	**V**
Cryptostylis hunterariani	Leafless Tongue Orchid	**V**
Grevillea caleyi	Caley's Grevillea	**E1**
Persoona hirsute subs hirsuta		**E1**
Lasiopetalum joyceae		**V**

LGA – Lane Cove Fauna threatened species – 8 species – 2 endangered		
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**
Glossopsitta Pusilla	Little Lorikeet	**V**
Miniopterus schreibersii oceanensis	Eastern Bent-wing Bat	**V**

LGA – Lane Cove Flora threatened species – 19 species – 7 endangered		
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	Magenta Lilly Pilly	**V**
Genoplesium baueri	Bauer's Midge Orchid	**V**
Persoona hirsute subs hirsuta		**E1**
Acacia terminalis subsp. terminalis	Sunshine Wattle	**E1**
Callistemon linearifolius	Netted Bottle Brush	**V**
Darwinia Bioflora		**V**
Eucalyptus nicolli	Narrow leafed Black Peppermint	**V**
Leptospermum deanei		**V**
Pimelea curviflora var curviflora		**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	Sunshine Wattle	**E1**

LGA – Ryde Fauna threatened species – 13 species – 4 endangered		
Scientific Name	**Common Name**	**Legal Status**
Pandion haliaetus	Osprey	**V**
Ixobrychus flavicollis	Black Bittern	**V**
Callocephalon fimbriatum	Gang Gang Cockatoo Population, Hornsby & 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**
Ephippiorhynchus asiaticus	Black Necked Stork	**E1**
Xanthomyza phrygia	Regent Honeyeater	**E1**

LGA – Ryde Flora threatened species – 13 species – 3 endangered		
Scientific Name	**Common Name**	**Legal Status**
Epacris purpurascens var. purpurascens		**V**
Callistemon linearifolius	Netted bottle Brush	**V**
Darwinia biflora		**V**
Leptospermum deanei		**V**
Melaleuca deanei		**V**
Tetratheca glandulosa		**V**
Eucalyptus nicolli	Narrow leafed Black Peppermint	**V**
Pimelea curviflora var curviflora		**V**
Genoplesium baueri	Bauer's Midge Orchid	**V**
Wilsonia backhousie	Narrow leafed Wlisonia	**V**
Grammitis stenphylla	Narrow leafed Finger Fern	**E1**
Prosanthera marifolia		**E4A**
Persononia hirsute subsp. hirsute/evoluta		**E1**

LGA – Willoughby Fauna threatened species – 7 species – 1 endangered		
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 – 11 species – 4 endangered		
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
Melaleuca deanei	Dean's paperbark	V
Syzygium paniculatum	Magenta Lilly Pilly	V
Grevillea caleyi	Caley's Grevillea	E1
Epacris purpurascens var purpurascene		V
Prostanthera marifolia		E4A
Lasiopetalum joyceae		
Sarcochilus hartmannii	Hartman's Sarcochilus	

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

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