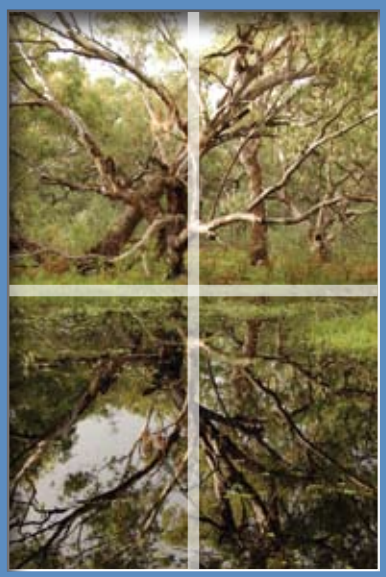
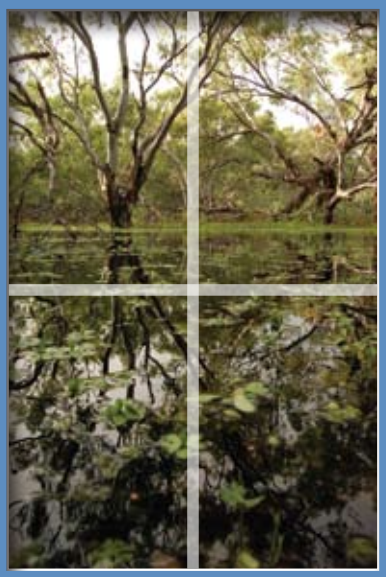
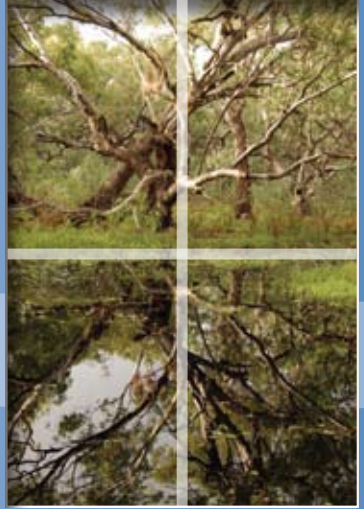




REGIONAL STATE OF THE ENVIRONMENT REPORT

FOR THE COUNCILS OF THE GREATER CENTRAL WEST REGION OF NSW
BATHURST, BLAYNEY, BOURKE, BREWARRINA, CABONNE, COONAMBLE, DUBBO, GILGANDRA, LACHLAN, MID-WESTERN, NARROMINE, OBERON, ORANGE, WARREN, WARRUMBUNGLE, WEDDIN AND WELLINGTON

2007–2008 SUPPLEMENTARY REPORT



Acknowledgements

The preparation of the Regional State of the Environment Report 2007-2008 was funded by the Central West Catchment Management Authority with contributions from the 17 participating local Councils. It should be noted that although a comprehensive SoE is not required until next year this report provides an opportunity to trial the reporting criteria and make any necessary adjustments.

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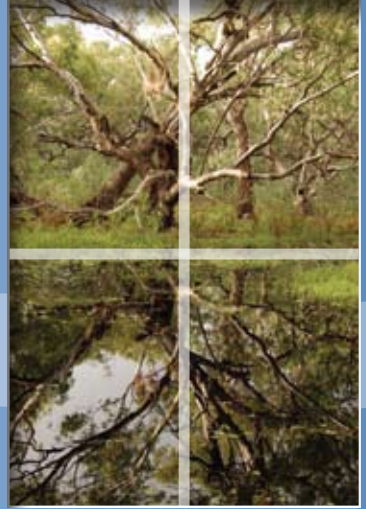
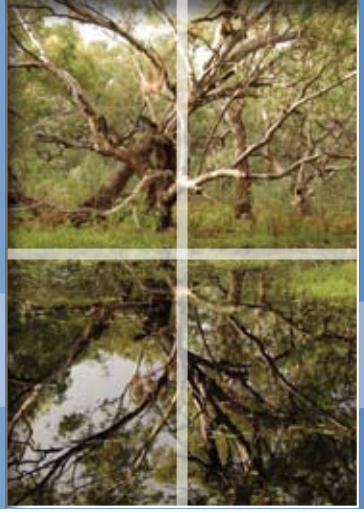


Abbreviations

ARG	Aborginal Reference Group
BFMC	Bushfire Management Committee
CAP	Catchment Action Plan
CentROC	Central West Regional Organisation of Councils
CCP	Cities for Climate Protection
CMA	Catchment Management Authority
DECC	Department of Environment and Climate Change
EC	Electrical Conductivity
EPA	Environmental Protection Authority
ETS	Emissions Trading Schemes
ha	Hectares
km2	Square kilometres
LEP	Local Environmental Plan
LES	Local Environmental Study
LGA	Local Government Area
ML	Megalitres
NRM	Natural Resource Management
NSW	New South Wales
NVA	Native Vegetation Act 2003
OROC	Orana Regional Organisation of Councils
PoEO	Protection of the Environment Operations Act 1997
RLPB	Rural Lands Protection Board
SEPP	State Environmental Planning Policy
SoE	State of the Environment

List of Figures

N.B. It is noted that for some indicators no data has been provided by a Council. Where there is data gap, the Council does not appear in the figure. A 'ZERO' (0) response is still shown in the figure.



Message from the Chair

This Regional State of the Environment (Regional SOE) Report is the result of a collaborative relationship between the participating catchment Councils and the Central West Catchment Management Authority (CMA).

This relationship has been fostered through the establishment of a Local Government Forum, instituted by the Central West CMA. The Forum provides an environment to advance constructive relationships aimed at promoting strategic and sustainable natural resource management, as outlined in the Memorandum of Understanding between the Catchment Management Authorities and the Local Government and Shires Association.

This Forum has proven very successful, creating many opportunities for the Central West CMA and Councils to partner in programs that improve the natural resources of the catchment, through the implementation of on-ground projects, community awareness raising programs, as well as capacity building for the Councils themselves through workshops, seminars and the sharing of resources.

One of the key criteria in the Memorandum of Understanding is the sharing of data and information. As such, the Central West CMA determined to facilitate a Regional SOE to assist the Councils to gather data from the State agencies, and fund the collection of this data into a report. This initiative has been welcomed by the Councils, as it provides greater consistency in the reporting and is more cost effective.

The Regional SOE won support from all the General Managers in both CentROC and OROC (Central and Orana Regional Organisation of Councils), some of which fall within the Lachlan and Western Catchment Management Areas. Consequently data from seventeen Councils is included in this report.

The Regional SOE is seen as an opportunity to detail the work undertaken by the Councils to care for their local environment and, in so doing, support the targets outlined in the Central West CMA's Catchment Action Plan. In addition, the report showcases the attributes of the region to the wider community, making it a potential vehicle to attract investment and tourism. Reporting at a regional level can also have additional benefits, in that common issues and regional solutions can be identified.

The Central West CMA is therefore, proud to have played a part in yet another collaborative project with the regional Councils that allows you and your local community to view some of the work being undertaken across the region to create vibrant communities and healthy landscapes.

Tom Gavel
Chairman, Central West Catchment Management Authority

Robert Gledhill
Chairman,
Lachlan Catchment
Management Authority

Rory Treweeke
Chairman,
Western Catchment
Management Authority

INTRODUCTION

1

Many Councils are also recognising the general increase in community awareness about sustainability, and are taking steps to report on sustainability initiatives undertaken both by Council and also those in the wider community.

1.1 What is a State of the Environment Report?

'Communities, both local and global, now recognise that humans and their activities impact on the state of their immediate environment and their natural surroundings. These human activities, creating pressure on our environment, require a response so that we can maintain and enhance the natural assets on which our quality of life depends'

Blue Mountains City Council, 2008

A State of the Environment (SoE) Report is an important management tool for local Councils and the New South Wales Catchment Management Authorities (NSW CMAs) to determine the effect of management actions on environmental conditions in the local area. Monitoring and reporting on the state of the environment over time increases our understanding of pressures on our environment, and their impacts, enabling us to respond more appropriately and effectively. Reporting on the state of the environment ensures that important information about our environment is made available to all members of the community.

It provides a snapshot of the:

- Pressures impacting upon the condition of the environment.
- State (or current condition) of the environment. i.e. the environmental quality and quantity of natural resources.
- Response by Councils and the community to address the pressures on the environment.

In accordance with the requirements of the *Local Government Act 1993* Councils are required to produce a comprehensive SoE Report on all major environmental impacts, related activities and management plans. The first SoE report of a Council for the year ending after each election of Councillors must be a comprehensive SoE. As such a comprehensive SoE is required once every four years. A supplementary report is developed in the intervening years to identify any new environmental impacts since the last SoE Report and update environmental trends. This Regional SoE is a supplementary document that supports the comprehensive 2004/2005 SoE reports from the 17 participating Councils. It is noted that the comprehensive report usually due in this period is delayed by the local government elections. This report will also make up a component of each Council's individual Annual Report pursuant to S.428 of the *Local Government Act 1993.*

Councils also have environmental responsibilities under other Acts and policies; not least of these responsibilities is the charter to consider ecologically sustainable development:

'to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible, in a manner that is consistent with and promotes the principles of ecologically sustainable development'

Local Government Act, 1993

Many Councils are also recognising the general increase in community awareness about sustainability, and are taking steps to report on sustainability initiatives undertaken both by Council and also those in the wider community.

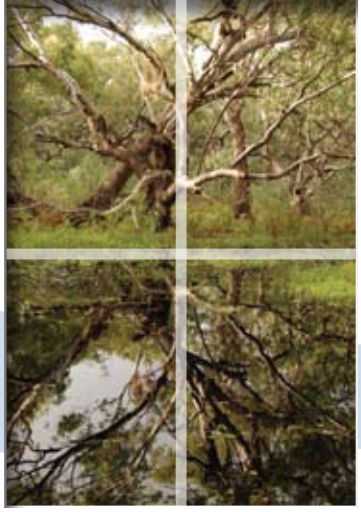
The Catchment Management Authorities, created by the *Catchment Management Authorities Act 2003,* are also required to provide reports on the progress made towards the regional environmental planning framework, the Catchment Action Plan. This Regional SoE provides benchmarks for measuring catchment-scale changes in the environment as measured by the local governments, and should be linked into both local government and CMA management plans.

The NSW State Plan outlines objectives and direction for the State of NSW. Councils need to demonstrate that they are working towards the objectives of the State Plan, which notes that:

'The State Government works closely with local government to provide the broader community with liveable cities and towns and to protect our natural environment'

NSW State Plan, 2006

Several of the objectives of the State Plan refer to environmental management. Provision of information through SoE and similar reports help to measure and monitor progress towards these objectives.



1.2 Why a Regional SoE?

This is the first SoE report supported by the Central West CMA. It was created to enable the community and the Councils of the Central and Western region to gain a better understanding of the state of the environment in a regional context.

Working together as a region enables the sharing of data, ideas and knowledge on environmental practices, sustainability reporting and innovation, the success of collaborative programs and the strengthening of regional links. This report is designed as a baseline document to provide an accessible environmental reporting tool for the communities of the Central and Western region, assisting Councils and Councillors to identify and monitor key environmental issues and to meet the legislative reporting requirements of the *Local Government Act 1993*. Each chapter of the report has been structured to reflect the accepted standard for SoE reporting known as the 'pressure-state -response' framework which is used at a State and Federal level. As this is a Regional SoE, the report focuses on common regional projects and provides a snapshot of some of the local projects, as case studies, undertaken by some of the 17 participating Councils during the 2007/2008 financial year.

The initiatives presented in this report for each participating Council do not reflect all of the initiatives undertaken by Councils during the reporting period. Furthermore, the format of the Regional SoE does not allow for each Council to identify progress on their environmental management and sustainability plans, which some Councils have previously included in their SoE reports. Councils do have the ability to append additional information specific to their Council in the back of this report.

It is noted that while many Councils have developed trends over time for many of the indicators, the information used in this Regional SoE provides a single 'snapshot' for the reporting year. Subsequent Regional SoEs will allow for trends over time to be seen.

1.3 Who is involved in this Regional SoE?

The majority of the Central West catchment Councils along with Bourke, Brewarrina and Weddin Shire Councils have determined to be involved in this Regional SoE Report. Bourke and Brewarrina Shire Councils are situated in the Western CMA while Weddin Shire Council lies in the Lachlan CMA (Figure 1).

The participating Councils are:

Bathurst Regional Council
Blayney Shire Council
Bourke Shire Council
Brewarrina Shire Council
Cabonne Council
Coonamble Shire Council
Dubbo City Council
Gilgandra Shire Council
Lachlan Shire Council
Mid-Western Regional Council
Narromine Shire Council
Oberon Council
Orange City Council
Warren Shire Council
Warrumbungle Shire Council
Weddin Shire Council and
Wellington Shire Council.

The participating Councils have provided data to be included in the Report with additional regional information sourced by the Central West CMA.

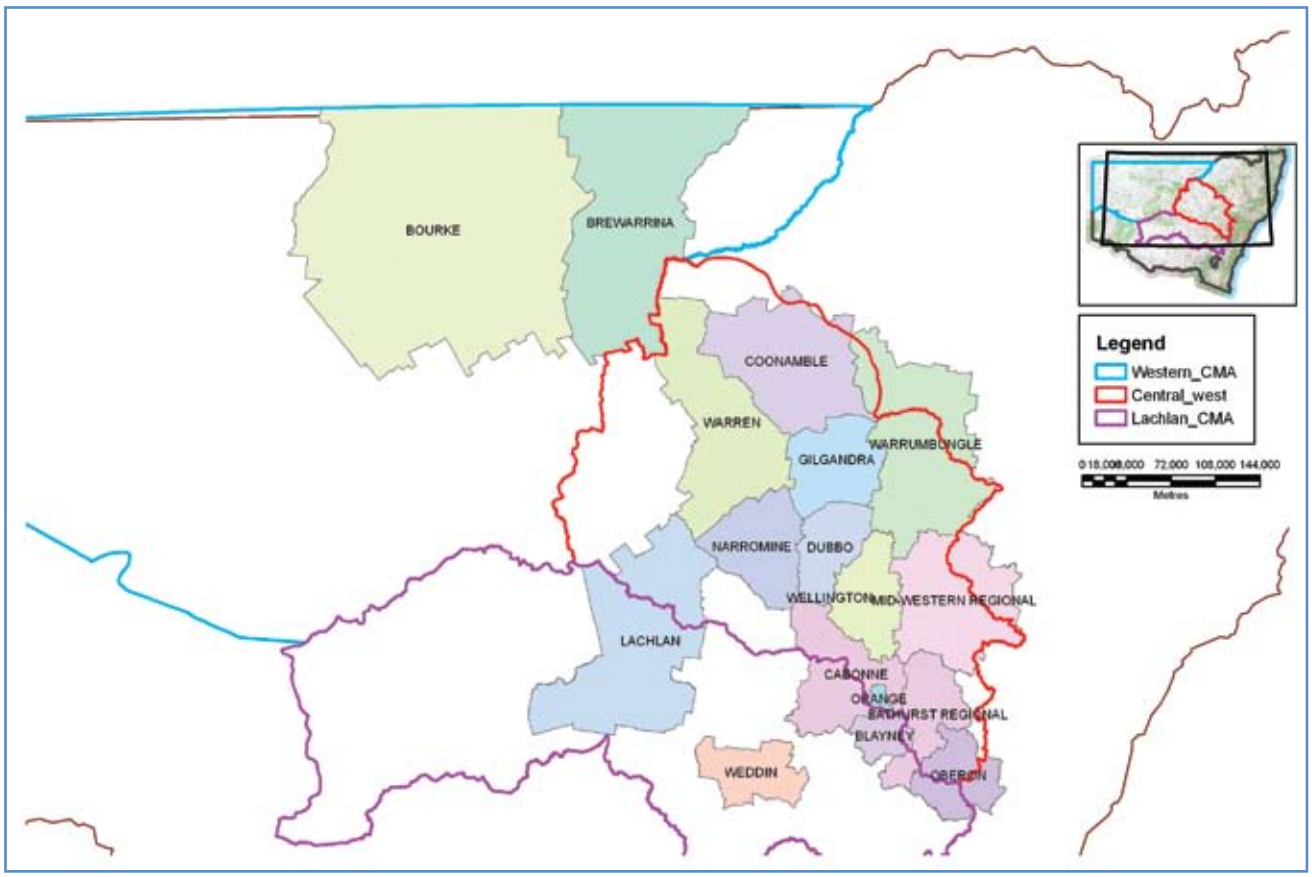
1.4 What are Catchment Management Authorities?

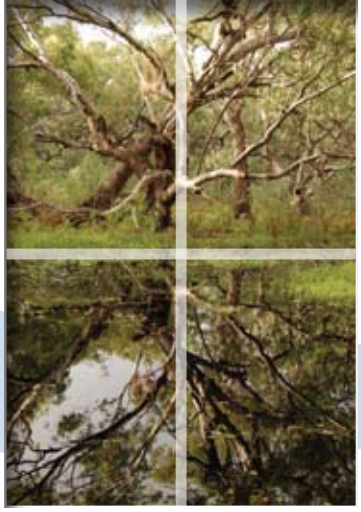
'Thirteen Catchment Management Authorities have been established across the State by the NSW Government to ensure that regional communities have a significant say in how natural resources are managed in their catchments.

The CMAs are locally driven organisations with a board that reports directly to the NSW Minister for Environment and Climate Change. These statutory bodies, established under the *Catchment Management Authorities Act 2003,* coordinate natural resource management (NRM) in each catchment. They are responsible for involving regional communities in management of the NRM issues facing their region, and are the primary means for the delivery of funding from the NSW and Commonwealth Governments to help land managers improve and restore the natural resources of the State.'

NSW Government, 2005

Figure 1 Map of the CMAs and participating Councils





The Central West CMA

The Central West catchment, located in central western NSW, has a diverse range of people and industries. The catchment supports the major centres of Bathurst, Orange, Mudgee and Dubbo. There are also many other smaller but significant townships including Coonamble, Gulargumbone, Nyngan, Warren, Coonabarabran, Gilgandra, Coolah, Trangie, Narromine, Wellington, Gulgong, Peak Hill, Molong and Oberon.

Major industries in the catchment include agriculture, agribusiness, tourism, mining and viticulture. The total population of the Central West catchment based on the 2001 Census was 185,515 persons incorporating a total indigenous population of 11,688 persons, which is 6.2% of the total population of the catchment (Central West CMA, 2008).

The Central West catchment includes the Castlereagh, Bogan and Macquarie River valleys and covers an area of approximately 90,000 square kilometres (km2). It is flanked by the Barwon-Darling catchment to the west and north-west, the Namoi catchment to the north-east, Lachlan to the south and Hunter and Hawkesbury-Nepean catchments to the east. While the upper reaches of the Bogan and Castlereagh Rivers are largely unregulated, rivers in the Macquarie Valley are highly regulated. Windamere Dam on the Cudgegong River upstream of Mudgee has a capacity of 368,000 Megalitres (ML) and the Burrendong Dam located at the junction of the Macquarie and Cudgegong River at Wellington has a capacity of 1,189,000 ML. River regulation and water extraction has had substantial effects on flow regimes, with changes to seasonal flow patterns, reduced variability and changes to flood intensity.

The soils of the catchment vary according to geology and landscape. Soil health issues can be broken up into three components - fertility (salinity, acidity, and nutrients), biology (the number, condition and type of soil biota) and physical characteristics (structure, sodicity and erosion). There is a high degree of interaction between the causes and effects relating to fertility, biological activity and physical characteristics. The tablelands and slopes have ratings of poor soil health, but there is a trend toward improved cropping and grazing management practices.

The region possesses a wide diversity of landforms, vegetation species and communities. At the time of European settlement, the Central West catchment supported a complex mosaic of forests, temperate and semi-arid woodlands, wetlands, shrub lands, heaths and grasslands. Clearing and subsequent degradation has reduced this natural vegetation cover to a large number of small, isolated remnants on the less fertile and productive soils. For example, the Box and Ironbark woodlands which originally occupied large parts of the slopes and plains have been reduced by as much as 90%, and are now among the most significantly altered plant communities in NSW (Central West CMA, 2008).

In many instances, the dominant species of those communities which have been heavily cleared are still relatively common in the landscape. However, remnants often occur as single trees or small groups of mature or senescent trees; these stands typically have little, if any, of the original understorey structure and species diversity, have no regeneration, and have essentially ceased to exist as functional ecosystems. In the case of native grasslands, remnant elements are generally scattered throughout the improved pastures, which dominate much of the region, as well as roadside remnants and travelling stock routes.

The Lachlan CMA

The Lachlan catchment covers an area of approximately 84,700 km2 and has a population greater than 100,000 people producing 14% of NSW agricultural production. The catchment encompasses 24 local government areas.

The Lachlan River rises near Gunning and terminates in the Great Cumbung Swamp near Oxley, 1450 river kilometres to the west. Major tributaries of the Lachlan include the Abercrombie, Boorowa, Belubula, Crookwell Rivers and Mandagery Creek. The main dam regulating flows in the Lachlan River is Wyangala Dam, which has a capacity of 1,220,000 ML and is located at the junction of the Lachlan and Abercrombie Rivers. The Belubula River is regulated by Carcoar Dam which has a capacity of 36,000 ML and located about 10 kilometres downstream of Blayney.

...these stands typically have little, if any, of the original understorey structure and species diversity, have no regeneration, and have essentially ceased to exist as functional ecosystems

The geological formations throughout the catchment are quite complex and have a significant impact on salinity. This variability requires effective management for erosion control, nutrient and salinity management (Lachlan CMA, 2008).

The Western CMA

The Western catchment is the largest catchment in NSW, covering some 230,000 km2. It includes the Barwon-Darling, Culgoa, Paroo, Warrego, Narran, Bokhara and Birrie River catchments. It takes in significant portions of the Bourke, Brewarrina, Central Darling, Cobar and Walgett Shires and the Unincorporated Area.

The catchment is predominantly leasehold land, administered under the *Western Lands Act 1901* by the Department of Lands. There are more than 630 pastoral and agricultural holdings. The population of the Western catchment is approximately 36,500 people.

Predominant land uses in this semi-arid zone are grazing, dryland cropping, irrigated cotton production, mining, tourism and natural conservation. Bourke, Brewarrina, Cobar, Walgett, Lightning Ridge and Broken Hill are the major service centres.

As well as a range of permanent and seasonal river systems, it also includes the largest and most diverse areas of natural rangelands within NSW (Western CMA, 2008).

1.5 Environmental indicators

Indicators are important management tools used in environmental reporting. They summarise and communicate information about the condition of key aspects of complex environments so that our decision making can be better informed. While many of the indicators for this first Regional SoE Report have been selected from past Council SoE Reports, some new indicators have been selected, for which all the participating Councils can provide meaningful data. Where indicators are new, data from previous years is not available to enable the presentation of environmental trends over time. This type of analysis will be provided in future Regional SoE reports.

1.6 The CMAs and the Councils at a glance

The 17 local government areas (LGAs) participating in this Regional SoE include a diverse area of Central and Western NSW, covering approximately 154,007 km2 and have a combined population of 214,358 (DLG, 2006). The region includes landscapes from the mountainous tablelands in the east, through the foot hills and slopes to the flatter river plains of central and northern NSW.

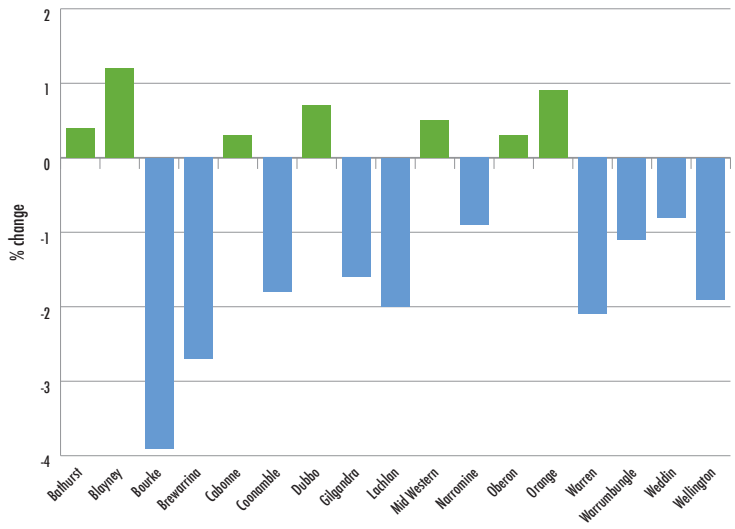
The size and diversity of the region provides many challenges to environmental management due to the variability of ecosystems, community expectations and available levels of resources across the region. In part, these challenges are being addressed through the work of the CMAs, in funding of both on-ground works, collating data and implementing monitoring programs across the region. Each Council also has a strong role to play and many have achieved significant outcomes in environmental management through daily operations and additional restoration projects.

The Regional SoE provides a benchmark against which these measures can be monitored.

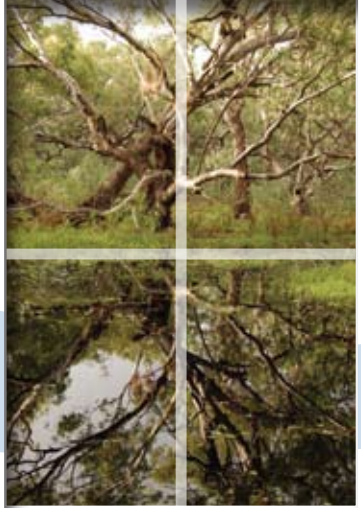
Community Profile

The population has changed over the reporting period. For 2006 – 2007, the average change across the 17 Councils was a decline of 0.83%. However, there was significant variation across the Councils with seven of the Councils increasing in population while 10 Councils decreased in population. This is shown in **Figure 2**, below.

Figure 2 Local government population changes 2006-2007



ABS 2006



Employment in the Central and Western area is in agriculture, manufacturing, retail, education, property, business services, and health and community services. Unemployment ranges from 3.7 to 12.2% in the participating LGAs (ABS, 2008). The unemployment rate is slightly higher than the State average at 6.1%, however employment is growing in most of the larger centres (Central West CMA, 2008).

There are some differences in age between the region and the NSW average; generally this is reflected by fewer people in the middle age groups and therefore higher numbers of youth and aged people (ABS, 2006). These differences are not significant, as shown in **Table 1**.

In the Central West and Northwest area, there are signficantly more people living in regional or remote areas compared to the State average, which indicates that 72% of people live in major cities. This will have a significant impact on the provision of services and also the environmental impacts caused by human settlement. A high proportion of people live in the inner regional areas. It is noted that some studies have shown differences between these places in terms of population characteristics such as income, Aboriginality and house ownership.

Table 1 Age profile for the region (percentage), 2006 Census

Age	NSW average	Central west and north west statistical subdivisions
0-14	19.6	22.0
15-24	13.6	12.6
25-34	14.2	11.0
35-44	14.6	13.5
45-54	13.7	13.8
55-64	10.9	12.0
65-74	7.0	8.2
75-84	4.9	5.2
85 and over	1.6	1.7

ABS 2006 Census

Table 2 Percentage urban/regional distribution, 2006 Census

Place of residence	NSW average	Central west and north west statistical subdivisions
Major city	72.6	0
Inner regional	20.3	59.9
Outer regional	6.5	30.5
Remote	0.5	8.8
Very remote	0.1	0.8

ABS 2006 Census

The Australian Bureau of Statistics utilises statistical subdivisions to collate data from the census. The central west and north west subdivisions capture the majority of the reporting area however may not reflect the boundaries of the 17 Councils exactly.

Climate in the Central West

The climate of the Central West is highly variable as it covers a large geographic area and a range of topographies. Broadly, these can be grouped into tablelands, slopes and plains, reflecting the influence of the Great Dividing Range in the east through the slopes to the floodplains of the west and north-west. There is an overall decline in average annual rainfall moving west from the tablelands to the plains **(Figure 3)**. Average daily minimum and maximum temperatures are lowest for the tablelands, intermediate for the slopes and highest for the plains **(Figure 4)**.

Figure 3 Average annual rainfall for the LGAs

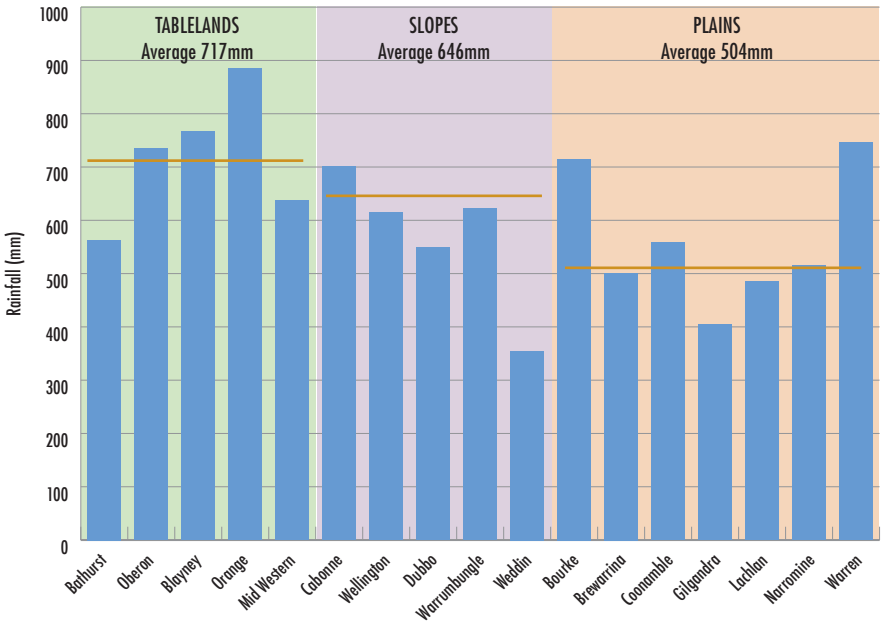
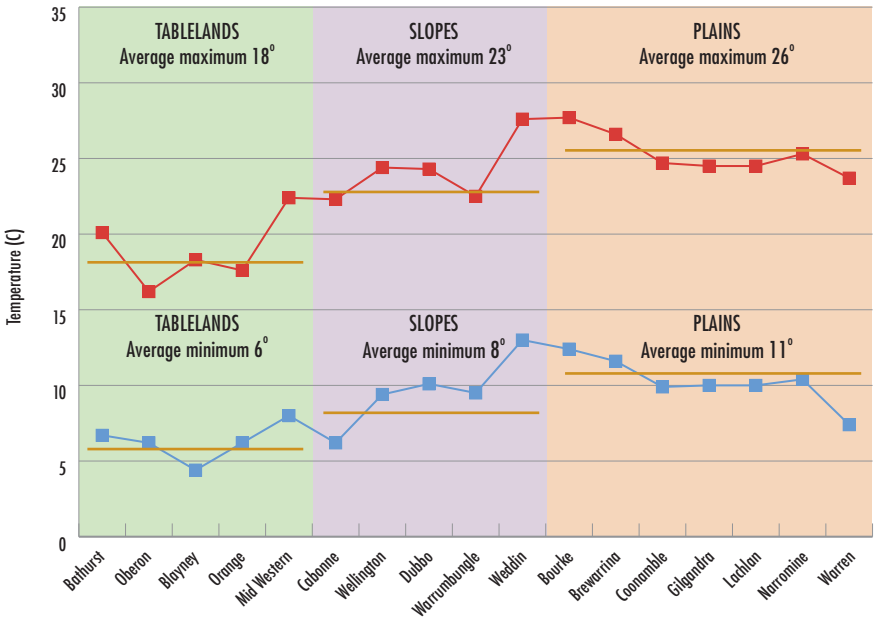
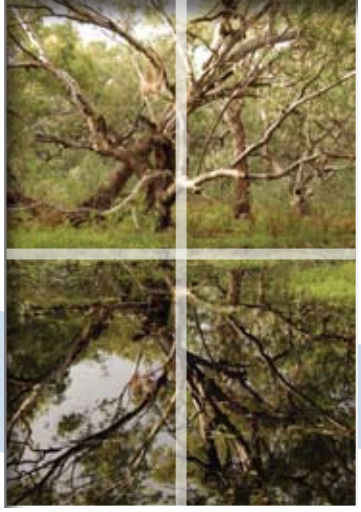


Figure 4 Average temperature range for the LGAs





1.7 This report

The chapters of this Regional SoE (Atmosphere, Biodiversity, Water, Human Settlement, Land, Cultural Heritage and The Sustainability Journey) are based on the widely accepted reporting areas for most local Councils, and also the listed areas of reporting required under the *Local Government Act 1993*. Each chapter addresses a significant area of potential environmental impact, and is structured to follow the state-pressure-response framework outlined above.

In the Land chapter, issues such as erosion, contamination, development, agriculture and salinity are addressed in relation to soil health and preservation, improvements in farm management and reservation of environmentally sensitive areas.

Atmosphere addresses those environmental impacts that affect the air, including greenhouse gas emissions and therefore climate change. Air pollution, vehicle emissions and the effects of fires (bushfires and other burns) are also discussed in this chapter.

Biodiversity looks at living things (flora and fauna) on both land and in water (aquatic biodiversity). Impacts may include clearing, habitat loss, pest animals and plants and fire. This chapter looks at responses such as fire management, works in weed control and threatened species preservation and the role of community volunteers.

In the Water chapter, both groundwater (aquifers) and surface water (rivers, creeks and dams) are discussed in relation to human impacts such as extraction (supply), salinity and disposal of waste (impacting on water quality). This includes discussion of litter, the use of water and the impact of dams and other regulations.

Human settlement covers a wide range of potential impacts including waste management, noise and planning and land-use. This includes hazardous chemicals and responses to illegal dumping, landfills and managing development across the region.

The Cultural Heritage chapter addresses both Aboriginal and European heritage (sites, places and items) and the preservation of these items, including the importance of education.

In chapter 8, the Regional SoE also addresses the significant role of environmental sustainability in Council operations, particularly as many of the participating Councils have undertaken projects or are planning to address the principles of ecologically sustainable development.

The size and diversity of the region provides many challenges to environmental management due to the variability of ecosystems, community expectations and available levels of resources across the region.

LAND

2

Land is a primary natural resource that underpins the environment, the economy and society.

This chapter focuses on the condition of the land in the Central and Western Council areas. Land is a primary natural resource that underpins the environment, the economy and society. The Central West landscape is diverse in character, including residential, agriculture, industrial and natural landscapes. The riverine and floodplain areas provide great aesthetic and recreational opportunities for the region's residents and tourists, as well as important water resources for the economy and environment. Land is a natural asset that can be considered to consist of:

- a diversity of geological forms
- topsoil availability
- soil health
- land that supports natural systems and
- land available to support a variety of human uses (including open space for public access).

Land provides a number of services that we rely on, including food production, rural/urban lifestyles and work and recreation opportunities that ultimately support human health. Land resources also provide a range of environmental services.

2.1 What are the pressures on land?

Erosion

Erosion is a significant land factor that influences the water quality in our streams, weed invasion and habitat degradation. Erosion generally occurs where land has been disturbed or where water concentrates, such as unsealed roads, roadsides and driveways, agricultural areas (cropping, land clearing and over grazing), industrial areas, stormwater outlets, where vegetation is otherwise removed and in waterways. Impacts from erosion include loss of habitat, soil loss, dust storms and sedimentation of waterways.

Contamination

Contaminated land has the potential for immediate or long-term adverse effects on human health and the environment. Land contamination is usually the impact of past land uses such as service stations, fuel depots, horticultural facilities, orchards, sheep dips, agri-chemical dumps, pistol ranges, mines, landfills and gasworks. A site is classified as contaminated when hazardous substances occur at concentrations that are above normal background levels, posing a potential risk to human health or the environment. The Department of Environment and Climate Change (DECC) maintains a register of contaminated sites, and local Councils also register further contaminated sites such as old landfills.

Development & Land Use

As a population grows, the demands for infrastructure such as housing, energy, water, transport and waste disposal also increases. Supplying this infrastructure results in land use changes and can have other negative impacts on the environment. Increasing the density of existing urban areas ('brownfield' development) can have advantages over new 'greenfield' sites, with economies of scale, lower impacts on surrounding native vegetation and agricultural lands and increased access to facilities such as recreation areas. It is important for Councils to ensure responsible and appropriate decisions are made relating to land use, in accordance with local environment plans, rural/urban strategies and State planning policies. A significant potential impact is from the urban fringe, where housing and associated infrastructure can not only affect the land but also other land uses such as agriculture. This area is also known as 'peri-urban', and is often typified by conflict over land use where the zones interface.

Agriculture

Agriculture can cause significant impacts on land if it is not managed sustainably. These impacts can include loss of groundcover, causing erosion and therefore loss of topsoil, changes to soil structure and health, increases in soil acidity and increased areas of soil scalds. Extreme impacts may lead to desertification and loss of soil fertility.

Salinity

While there are many causes of salinity (including irrigation and removal of vegetation), the effects on land resources can be very significant regardless of the cause. Salinity changes the soil structure, increasing the erosion hazard. Limited vegetation will grow on saline areas, reducing feed for stock, habitat for native species and changing the local ecosystem.

Salt also affects infrastructure such as roads and buildings which may cause high economic impacts on the local Council. For example, the salinity impacts on rural roads have been costed between $100/km/year (very slight impact) and $1200/km/year (severe impact) (DIPNR, 2005). Salt loads in rivers is measured in electrical conductivity and many sites have been monitored as electrical conductivity (EC) over several years, which allows for trends over time to be analysed. Salinity levels in rivers are discussed in Water (Chapter 5) and shown in **Table 10**.

2.2 What is the state of our land?

Due to varying levels of resources available to Councils, there are limitations on the data provided for use as regional indicators to determine the current state of land. The reporting indicators that have been chosen are based on their availability to the majority of participating Councils. Lack of information is acknowledged as a potential problem to environmental reporting programs.

Figure 5 Aerial imagery of the reporting LGAs

Spot 5 Satellite 2005 Scale 1:2,750,000

Aerial imagery such as that shown in **Figure 5** can be used to show changes in land use over time. While a single image of this scale does not allow a detailed study of land use patterns and changes, it does provide a 'snapshot' of vegetated areas, major waterways and other larger landscape features. This image indicates the agricultural nature of the reporting Councils and variation in vegetation type across the reporting area (shown in the different shades of vegetation). It also indicates the importance that land use planning has in protecting and or impacting upon the river systems in the landscape, which are critical to the life of the catchment.

Not all contaminated sites are required to be placed on this register, and therefore the impacts from other potentially contaminated sites are not yet known.

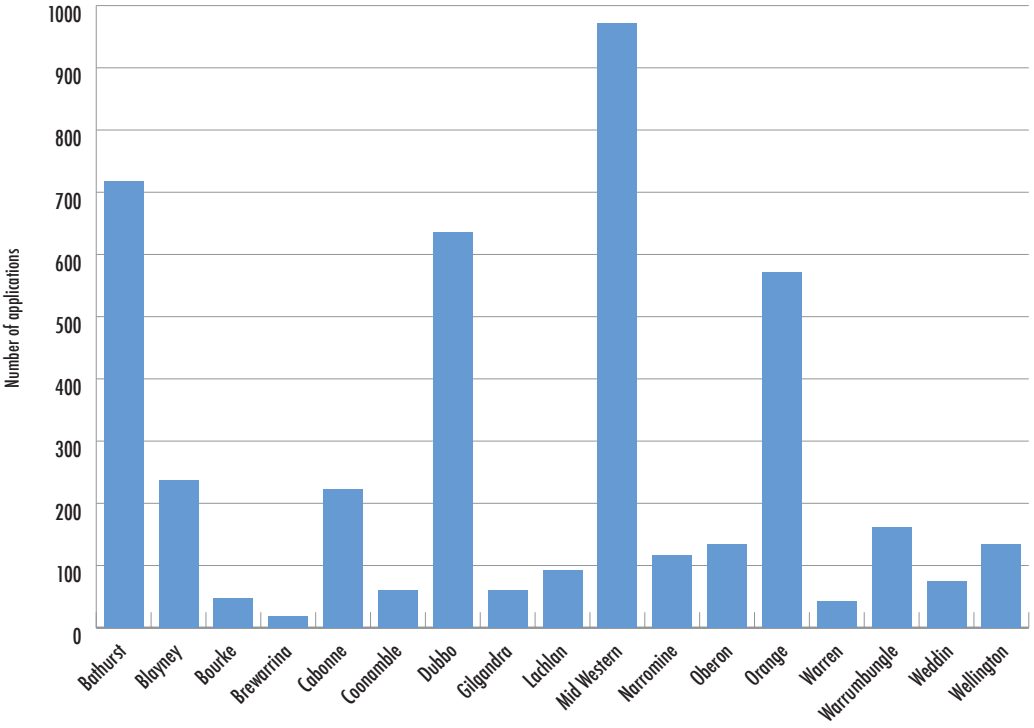
Table 3 Contaminated sites in the reporting Councils

Council	Contaminated land register	Potentially contaminated sites
Bathurst	3	2
Blayney	0	No data provided
Bourke	0	No data provided
Brewarrina	0	0
Cabonne	0	No data provided
Coonamble	0	2
Dubbo	1	375
Gilgandra	0	No data provided
Lachlan	0	Landfills and service stations
Mid-Western	0	46 potential sites, 12 waste depots, 1 gas works (remediated)
Narromine	0	50
Oberon	0	20
Orange	1	4 operating service stations
Warren	0	No data provided
Warrumbungle	0	Approximately 40
Weddin	1	No data provided
Wellington	0	24 (including gasworks remediation site)

As noted in Section 2.1, contaminated sites may have a significant impact on land resources. The number of sites within each Council area registered under the *Contaminated Land Management Act 1997* register is shown in **Table 3**. Not all contaminated sites are required to be placed on this register, and therefore the impacts from other potentially contaminated sites are not yet known. Some potentially contaminated sites including landfills, petroleum storage tanks and industrial sites are also shown in **Table 3**. Other unidentified sites that pose a risk to human health or the environment may exist within the reporting area.

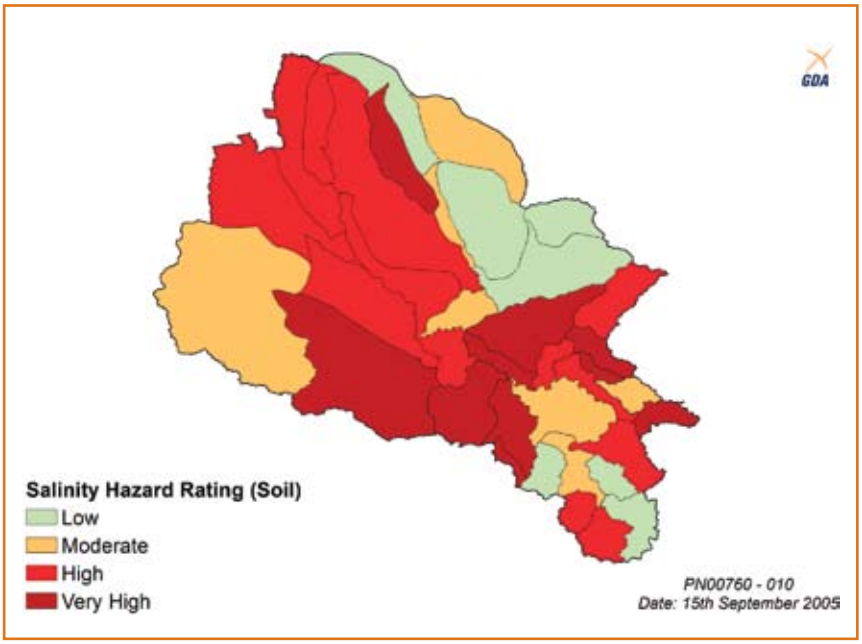
Currently there are inconsistencies across the Councils in terms of zones and zone definitions; however the recent State Government changes in land use planning will ensure that all Councils use standard zones and definitions. The current zones are shown in Appendix 1.

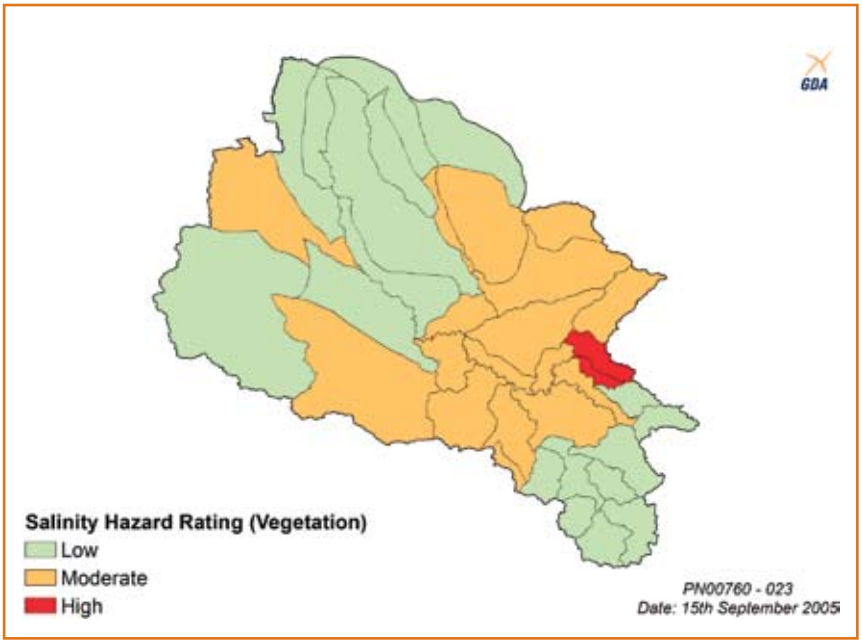
Figure 6 Number of development applications in each LGA



The number, type and location of development applications can provide some information on the potential level of development impacts on land. While the numbers of development applications lodged with Councils do fluctuate with economic cycles and other factors such as the size of the population and presence of industries; as a general trend they reflect the likely levels of development impacts on the LGA. **Figure 6** shows the number of development applications approved during the reporting period for each of the Council areas. Note that the Council areas with large numbers of development applications correspond with those Council areas with positive population growth in **Figure 2**.

Figures 7a & 7b Salinity hazard mapping (soils and vegetation) for the Central West





Central West CMA 2008

Salinity hazards change over time due to a range of influences such as mobility and amount of water in the landscape, land use changes, land management practices and development. Generally, the hazard in the landscape can be identified from ground water levels and soil types and these provide an indication of the areas in which salinity is likely to be a high risk and may therefore have a significant impact on the landscape. The salinity maps shown in **Figures 7a & 7b** indicate areas of potential high risk salinity hazards. Vegetation mapping indicates vegetation types that are at particular risk of salinity effects (high around Mid-Western Regional Council), and soil mapping reflects soil types that are at particular risk of salinity effects (widespread across the catchment).

2.3 What is our response?

Development & Land Use

The *Environmental Planning and Assessment Act* provides the framework for land use planning in NSW, while the State Government also uses instruments such as State Environmental Planning Policies. Local Councils have responsibility for local planning through Local Environmental Plans.

The NSW Government has recently made changes to the planning system through a planning reform process, including a standard template for Local Environmental Plans (LEPs) and a reduction in the number of State Environmental Planning Policies (SEPPs). Councils are now required to review the LEP every five years. Over the past year, several participating Councils have undertaken studies to review their LEPs, including Local Environment Strategies (LES) and Local Profiles. Some have obtained funding from the State Government Planning Reform Fund to undertake these studies. These studies provide significant information on the local environment and inform zoning decisions within the LEP. Recent LEP review studies have been undertaken by Warrumbungle and Wellington Councils, and Brewarrina, Bourke and Central Darling (not in this Regional SoE) Shires have also obtained funding for a joint project. Bathurst Regional Council has a review in progress. Improved zoning decisions can be made with the details available in the relevant LES, including identification of environmentally sensitive lands.

Rural and Land Use Strategies also provide significant information and planning controls for non-urban areas in the Central West. Councils such as Bathurst; Blayney, Cabonne and Orange (in alliance); Narromine, Gilgandra, Warren, Coonamble and Bogan (joint project); Dubbo and Mid-Western Regional have recently undertaken these studies. Key issues identified in rural studies include the loss of prime agricultural land, encroachment on rural lands from other forms of development and environmental sustainability of agriculture, which are identified as peri-urban impacts.

'The Strategy seeks to reconcile these conflicts so that future development of economic benefit to the community is only undertaken in such a manner that it is environmentally sound in the long term. The key issues affecting the SubRegion...are related to the protection of agriculture and primary production including mineral resources, forestry and energy generation, development of industry, impacts of residential and rural subdivision, protection of the natural and scenic environment as well as heritage and culture.'

Councils of Blayney, Cabonne and Orange City Sub-Regional Rural and Industrial Land Use Strategy, 2008

It is noted that several of the Councils have little pressure from urban development, with decreasing populations and economies, and are seeking to improve the development potential of the Council area. This is shown in **Figure 2** (Chapter 1) and includes those Councils with higher than average population declines, such as Bourke, Brewarrina, Lachlan and Warren. This is also reflected in **Figure 6**, showing the number of development applications received at each Council during the reporting period.

Agriculture

A significant focus of CMA funding programs has been improving soil management in agriculture, not only for soil health but also to limit soil losses from impacts of stock, stormwater and flooding, and wind erosion. Targeted incentive funding for farmers has included increased groundcover percentages and improving soil tillage and improving the organic content of soils. **Table 4** (overleaf) outlines management targets under the Central West Catchment Action Plan, which include:

'By 2016, 50,000ha of the catchment will be managed to have a desirable perennial plant component for landscape protection (MTSS1).'

Central West Catchment Action Plan, 2006

The Central West CMA Annual Report notes that approximately 28,105ha is now managed for perennial plants under landscape protection projects which is more than 50% of the target **(Table 4)**.

Rehabilitation of degraded sites has also been a significant activity to reduce impacts on land resources. Programs undertaken by private landholders, the CMAs and Councils have included re-vegetation of streams and creeks to limit stream bank erosion; improving land management of salinity recharge areas, which also contribute to soil damage and erosion hazards; soil conservation works such as contour banks and gully remediation on farms and some public lands and improving industrial development rehabilitation conditions for larger impact activities such as quarries and mines.

Urban Sediment

Many of the reporting Councils have developed sediment and erosion control policies, which although relating primarily to urban areas, aim to mitigate the effects of stormwater on water quality. For example, they may require builders to install sediment controls around a site to prevent any erosion leaving the site, and to keep and stockpile topsoil for rehabilitation purposes. This is further discussed in Water (Chapter 5).

Contamination

A range of projects have been undertaken across the reporting area to address this issue. Responses to contamination include both research to locate and identify contaminated sites, and on ground works to address contamination issues. For example, Bathurst Regional Council was able to gain funding from DECC to implement remediation of the former Bathurst Gasworks site, a scheduled site under the *Contaminated Lands Management Act 1997*. This funding allowed studies to prioritise remedial actions, based on risk assessment, and implement stage one of the works to address the most significant risks found on the site. Wellington Shire Council is also working on a former gasworks site.

Table 4 Central West CMA catchment programs for soil management

Soil	MTSS1 – 50,000ha of the catchment will be managed to have a desirable perennial plant component for landscape protection.	28,105ha	50,000ha
	MTSS2 – 690,000ha of cropping land is managed using Best Management Practice for soil health.	582,777ha	690,000ha
	MTSS3 – 1,000,000ha of land is managed under integrated property management plans (PMPs).	467,838ha	1,000,000ha
	MTSS4 – 20,000ha of woody weed dominant areas are managed for increased biodiversity and improved landscape function.	9,538ha	20,000ha
	MTSS5 – 12,000ha of sodic soils are managed to improve soil structure and to restore productive vegetation cover.	7,088ha	12,000ha

Central West CMA Annual Report, 2006-2007

Many of the Councils have identified a list of potentially contaminated sites and are seeking funding or cooperative projects. For example, Lachlan Shire Council has identified that priority areas are older landfills and disused service stations. It is noted that there is only limited information for potentially contaminated sites.

Salinity

Salinity management has traditionally been the role of the agricultural sector and State government, through remedial works, education programs and monitoring of river salinity levels. Councils are starting to address the issue, depending on the current level of risk identified in the LGA and therefore the priority of the issue to the local community. For example, Dubbo City Council has identified urban salinity as an issue for some years and implemented a range of programs. One program is outlined in the case study found in this chapter, the Urban Salinity Network. A number of Councils have identified salinity as a high risk and undertaken programs to address the impacts, such as Dubbo and Mid-Western, whereas some Councils have not prioritised salinity as an issue to address as this stage.

The Central West CMA has a salinity management program under the Catchment Action Plan (CAP). This program targets replanting and management of recharge areas through the use of perennial plants and other vegetation on agricultural land. It also addresses improving water efficiency in irrigation areas to limit groundwater recharge in saline areas, and encourages Councils to address urban salinity issues.

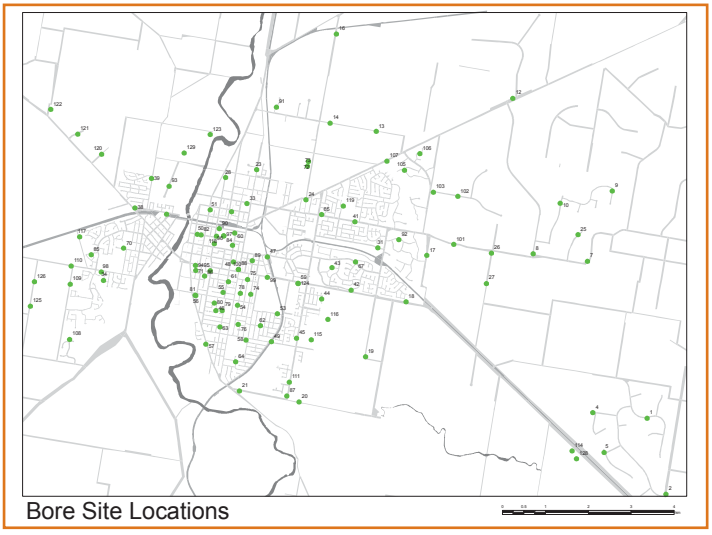
CASE STUDY

Dubbo City Council

Urban Salinity Network

Salinity occurs throughout the Dubbo area. Salinity can affect infrastructure such as buildings, driveways, fences and roads as well as limiting plant growth. Dubbo City Council sees that local industry, Council and the community are faced with extra construction, maintenance and operation costs to protect against salinity. Council has therefore invested in a range of management options to effectively monitor and manage salinity in and around Dubbo

Commencing in 2004 and consisting of 129 bores covering the Dubbo urban area, the Dubbo Urban Salinity Network is one of the best monitoring networks in Australia. Groundwater levels and conductivity data are collected monthly to assist Council in effectively managing salinity across the urban area. In 2006 the network was enhanced through the installation of five (5) weather stations which collect rainfall, temperature, wind and humidity data which are available to view on Council's website. Five of the bore network sites have now been fitted with interpretive signs to demonstrate groundwater levels to the community.



Top: Interpretive sign showing groundwater levels
Below: Location of monitoring bores

ATMOSPHERE

3

The total number of days where particulate pollution exceeds the national standards is far higher in rural areas than in Sydney, the Illawarra or the Lower Hunter

The atmosphere surrounding the earth consists of a complex mix of gases that support life on earth by providing air for us to breathe and maintaining a suitable temperature. This balance includes nitrogen (78%), oxygen (21%), carbon dioxide (0.04%), small trace amounts of other gases and water vapour. The atmosphere is an essential natural asset that supports the health of the planet and our quality of life. Our atmosphere also regulates the type and amount of radiation that hits the earth's surface from the sun (the ozone layer), regulates temperature (through the greenhouse effect) and provides the specific gases (air) that plants need to grow and animals, including people, need to breathe.

However, there are substances in the air which may impair the health of humans, plants and animals, reduce visibility or change the temperature balance. While many of these substances, including greenhouse gases and some pollutants (such as dust) occur naturally, human based activity has rapidly increased the amount of these substances in our atmosphere, which has resulted in impacts to air quality and changes to our earth's climate system.

These changes have included depletion of the ozone layer; while monitoring of the ozone layer shows a recent stabilisation of atmospheric ozone, levels are still significantly below pre-1980 levels. One of the most significant environmental issues facing our community is human induced climate change caused by greenhouse gases, whereby the addition of carbon dioxide and some other gases to the atmosphere is increasing the rate at which our atmosphere warms.

3.1 What are the pressures on the atmosphere?

Agriculture

Some agricultural activities can impact on the atmosphere, including stubble burning, spray drift and dust caused by tillage. Stubble burning, believed to have returned nutrients to the soil following harvest of a crop, produces smoke and ash across large areas of land as well as releasing large amounts of carbon dioxide. This practice is becoming less favoured as conservation farming techniques promote retention of organic matter. Spray drift from application of herbicides and pesticides, including aerially applied sprays (crop dusting) is penalised under pollution regulation however it still occurs on a regular basis and affects both biodiversity and human health. Ploughing or tilling the soil in dry conditions causes dust, and in the recent dry climate dust storms have been recorded across the reporting area. Dust has significant human health impacts.

Solid Fuel Heaters and Backyard Burning

Domestic wood heating, industrial premises and diesel vehicles are the major sources of particulate pollution in urban areas (DECC 2006). There is little data available relating to the number of wood heaters in use, although some Councils do have complaint records relating to wood smoke.

Open burning is also a significant source of particle pollution. It is regulated by the Protection of the Environment Operations (Clean Air) Regulation 2002. The Regulation prohibits burning of certain articles and vegetation in urban areas and regulates conditions in which burning can be undertaken in rural areas. The burning of dead and dry vegetation in urban areas of the Central and Western region may be permitted in some circumstances, depending on the policies of the local Council and Rural Fire Service. The total number of days where particulate pollution exceeds the national standards is far higher in rural areas than in Sydney, the Illawarra or the Lower Hunter (DECC 2006).

Fires

Bushfires emit large quantities of carbon dioxide, other gases, and also significant amounts of particulates. Bushfire management activities involving the prescribed use of fire (for hazard reduction) are highly regulated, both operationally and with regards to potential environmental impacts. The local area Bush

Fire Risk Management Plans contain references to smoke management, and the need for operational plans to consider the effects of smoke on nearby residences, and sensitive locations such as hospitals, aged care facilities, schools and tourist centres. These plans state that all burn plans must include measures to reduce the impact of smoke as far as practicable. While a number of prescribed burns were conducted within the region during the reporting period, the lack of scientific data makes it difficult to quantify the contribution prescribed burning has on reduced local and regional air quality.

It is noted that fire is also a useful tool in natural resource management as it may encourage some species to regenerate and remove some weed threats. Many local ecosystems are adapted to fire in this role.

The impact of smoke resulting from wildfire is impossible to manage and may have significant implications for local and regional air quality. Given the weather conditions that are conducive to very high and extreme fire danger across the Central and Western Council areas, the occurrence of wildfire under these conditions will typically result in large quantities of smoke being blown for long distances downwind of the fire. This has the potential to severely impact on air quality within the region, affecting residents, tourists and businesses alike. The composition of smoke from an intense wildfire may be substantially different from that of a low intensity prescribed burn, and exposure may have implications for the health of persons with respiratory illness (DECC 2006).

Although numerous fires were attended and extinguished by both the NSW Fire Brigades and the NSW Rural Fire Service during the reporting period, there is no data available for the reported incident impacts on local or regional air quality.

Motor Vehicles

Although vehicle numbers and kilometres travelled are increasing, improved technologies and tighter regulatory controls are expected to reduce per capita motor vehicle emissions each year. Vehicle emissions contribute to reduced local air quality due to particulate pollutants, volatile organic compounds and nitrous oxides. Rising fuel prices are beginning to impact on personal use of cars however with few public transport options outside of major centres, the Central and Western Council areas will face increasing emissions from fuel use for the foreseeable future.

Commercial and Industrial Sources

Under the Protection of the *Environment Operations Act 1997* (*PoEO Act 1997*), industries over a certain threshold must be licensed to pollute air or water. There are approximately 151 active Environment Protection Licences for premises across the reporting area, as issued by the NSW Environmental Protection Authority (EPA) under the *PoEO Act 1997*. Many of these activities are licensed for emissions other than air, and a number are issued to Council's own operational facilities. During the reporting period, the public made a number of complaints to the EPA Environment Line and also the local Councils regarding air pollution incidents in the reporting area. Smaller industries may also cause pollution, and the local Council has regulatory controls over these premises. However, few of the reporting Councils have records on the number of complaints made by the community and this is currently a data gap.

The National Pollution Inventory also records emissions for 93 compounds, and is a National Environmental Protection Measure implemented by the national environment department. It includes point source and diffuse emissions, some reported directly by industrial sources and some estimated by the relevant State government.

Greenhouse Gas Emissions

While the reporting area has seen a small overall decrease in population, this is in part balanced by the large population increases within a few Council areas such as Orange. Generally, gross resource consumption per capita is increasing throughout NSW and is likely to have increased the greenhouse gas emissions attributable to our community. Most of the increases in Australia's greenhouse gas emissions over the past decade have come from the generation and use of energy, agriculture (including land clearing and enteric fermentation), waste, land-use changes and motor vehicles. In 2004 NSW emissions were 158.7 million tonnes of carbon dioxide (DECC 2006).

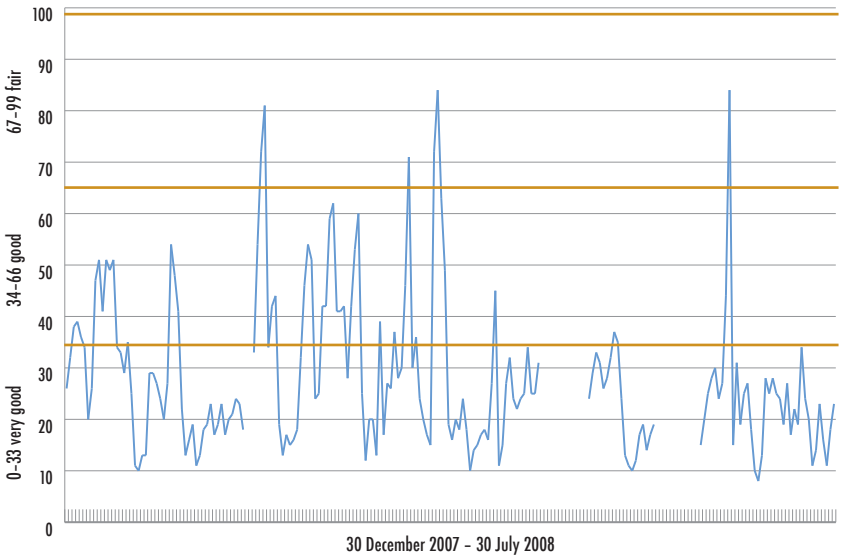
Indoor Air Pollution

Indoor air includes air in homes, schools, shopping centres, vehicles, and indoor workplaces. Australians spend approximately 85% of their time indoors, much of it at home (DECC 2006). The quality of indoor air depends on factors such as the type of building materials used; the types of products used indoors (including paint, electrical appliances, furniture and cleaning products); the proximity to outdoor sources of air pollution; types of indoor heating or cooling used; building ventilation rates; the use of the building (including whether smoking occurs); and diurnal, seasonal and climatic conditions. Many pollutants, such as nitrogen dioxide, carbon monoxide, fine particles and formaldehyde, can be present at higher concentrations indoors than outdoors. The National Occupational Health and Safety Commission sets exposure standards for workplaces, but there are no Australian standards for indoor air in other settings.

3.2 What is the state of the atmosphere?

Much of the State-level air quality monitoring is confined to the Greater Metropolitan area, which includes Sydney, Wollongong and Newcastle. DECC has recently begun monitoring at one site in the reporting region, Bathurst. Data from this site is limited to Bathurst, however **Figure 8** below gives an indication of the Regional Air Quality Index.

Figure 8 Regional air quality data (particulates) for Bathurst



Data from DECC's Regional Air Quality Index, September 2008

During the reporting period, most days recorded very good or good air quality, with a small number in the fair range. No days were recorded as lower than fair, with the remaining categories 100 – 149 (poor), 150 – 199 (very poor) and 200+ (hazardous) **(Figure 8)**. This indicates that there were no significant issues with air quality around the Bathurst area during the reporting period.

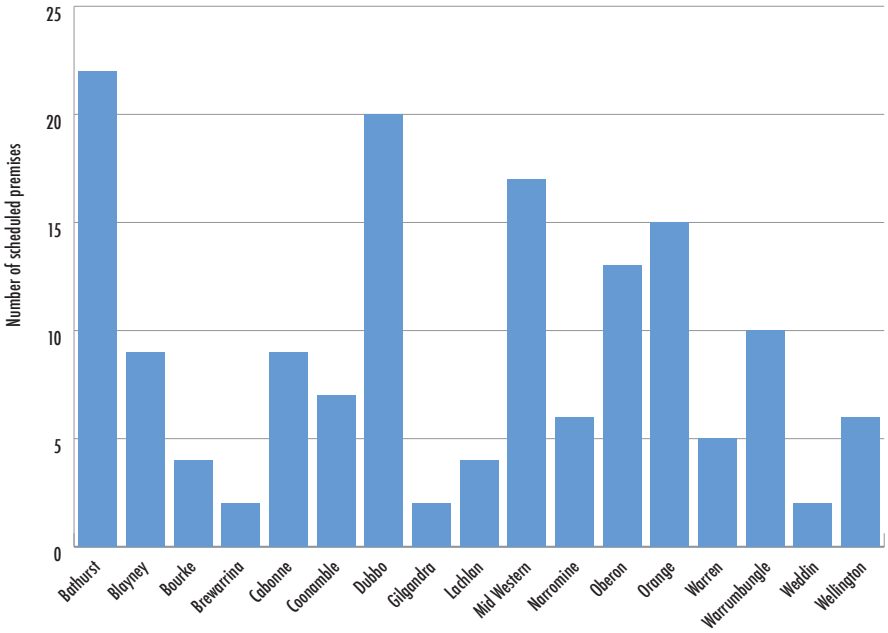
Table 5 Number of premises on the National Pollution Inventory

Council	Number of substances	Number of premises	Diffuse sources	Highest sources
Bathurst	68	9	18	Domestic/commercial aerosols and solvents, food manufacture, motor vehicles
Blayney	17	1	9	Food manufacture, cropping, pasture
Bourke	10	4	9	Mineral/mining/chemical wholesaling, cropping
Brewarrina	2	0	9	Pasture, cropping
Cabonne	23	2	9	Metal ore mining, pasture, cropping
Coonamble	9	1	9	Mineral/metal/chemical wholesaling, cropping, pasture
Dubbo	31	8	9	Meat and meat product manufacture, mineral/metal/chemical wholesaling, cropping, pasture
Gilgandra	2	0	9	Cropping, pasture
Lachlan	3	1	9	Cropping, pasture
Mid-Western	73	8	43	Domestic/commercial solvents/aerosols, cement/lime/plaster/concrete manufacture, architectural surface coatings, coal mining, burning/wildfire
Narromine	2	0	9	Cropping, pasture
Oberon	72	5	33	Domestic/commercial solvents/aerosols, log sawmilling and timber dressing, other wood product manufacture, architectural surface coatings, motor vehicles
Orange	11	2	9	Mineral/metal/chemical wholesaling, cropping, pasture, water supply/sewerage/drainage services
Warren	2	0	9	Cropping, pasture
Warrumbungle	2	0	20	Cropping, pasture, cotton
Weddin	2	0	9	Cropping, pasture
Wellington	68	11	53	Motor vehicles, solid fuel burning (domestic), fuel combustion, domestic/commercial solvents/aerosols, windblown dust

2008 NPI Database Search by LGA, 2006/2007 reporting year

Table 5 gives an indication of the significant role that agriculture plays in atmospheric emissions, with a high number of LGAs showing cropping and unimproved and improved pasture as the highest recorded emission sources for that LGA. The role of particular industries in some LGAs is also reflected. For example, the highest emissions sources for Oberon Council are sawmilling and other timber dressing; this industry is the largest in the Oberon LGA and contributes significantly to the local economy. The number of emissions and facilities in each LGA also indicate the priority of atmospheric emissions in that LGA. For example, the larger Councils of Bathurst, Cabonne, Mid-Western, Oberon and Wellington all have more than 20 substances recorded and a high number of diffuse sources, indicating that pollution control will be a focus for that Council and DECC.

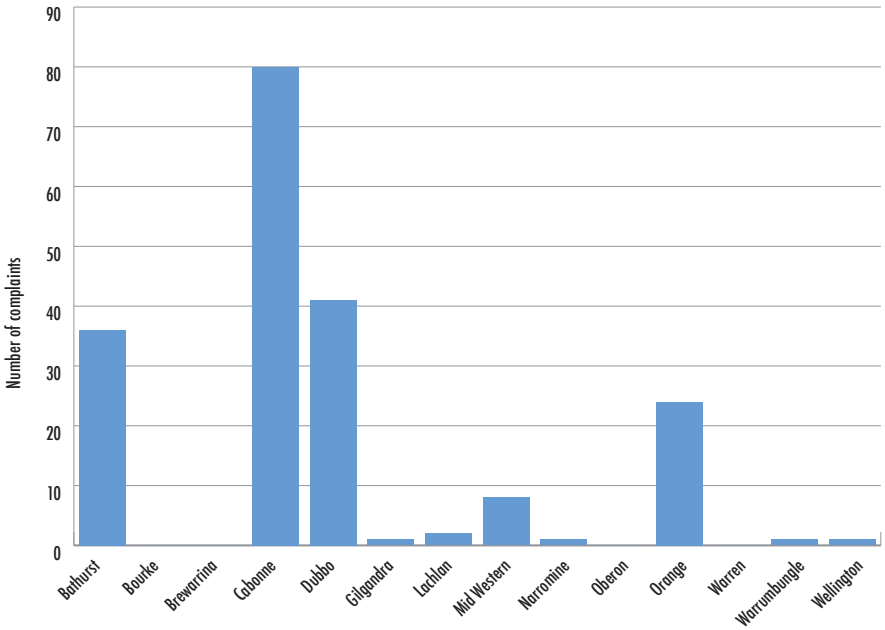
Figure 9 Number of scheduled premises under *PoEO* in each LGA



PoEO Public Register Search, 25/09/2008

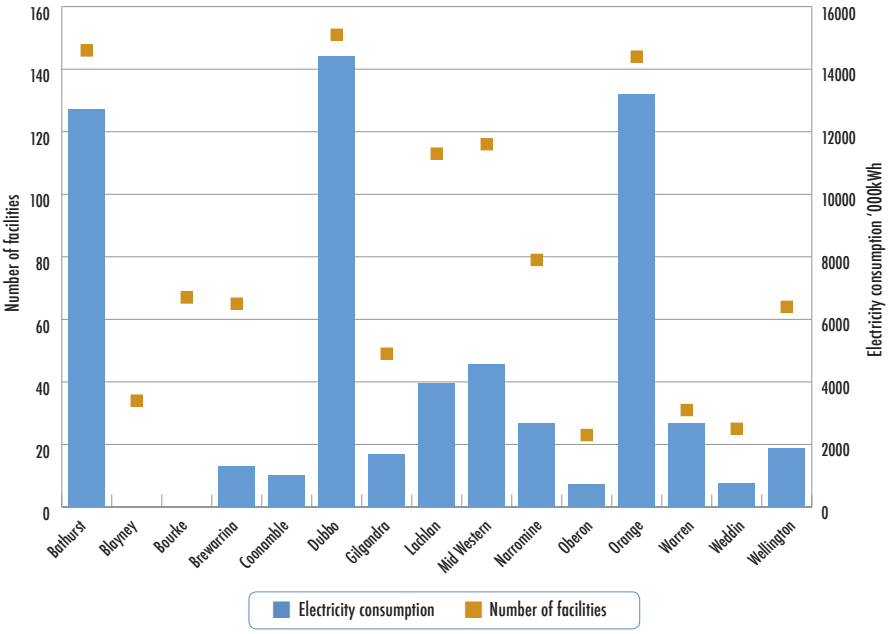
Figure 9 indicates the number of scheduled premises under the *PoEO Act 1997* for each LGA. It is noted that the type of licence is not recorded in this figure, and several licences are not for air pollution. Most reporting Councils hold several licences under the *PoEO Act 1997* for their own operational facilities, which are included in the numbers above. The number of licences also reflects the population size of the Councils with more premises in the larger Councils and fewer in the smaller Councils, as expected.

Figure 10 Complaints to Councils regarding air emissions



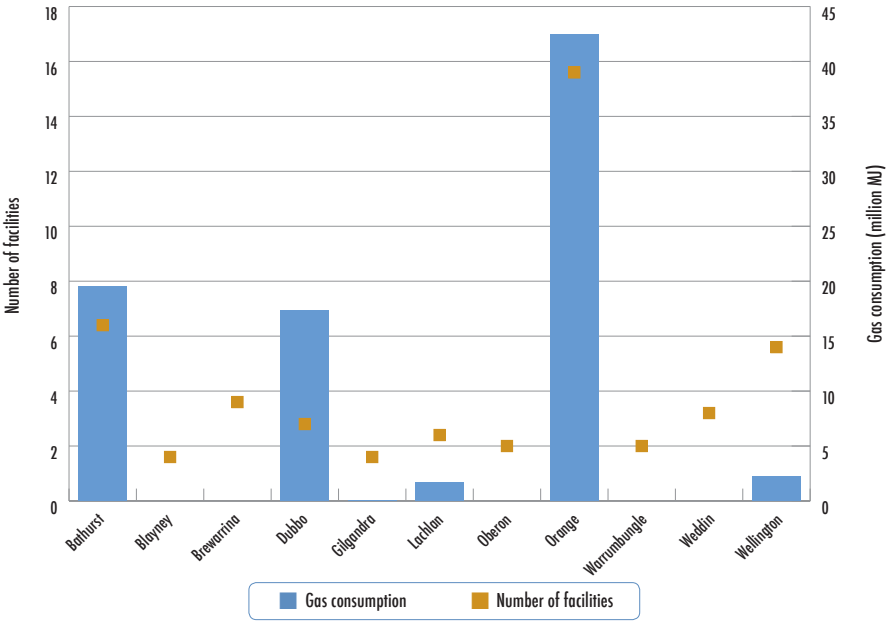
Where noted, the complaints are typically related to odour from premises such as food outlets, dust or the smoke from burning activity. Many of the complaints received by Cabonne Shire Council were related to a canola processing facility since it has been commissioned. However, complaint records are typically a data gap in most Councils as shown by the lack of data in **Figure 10**. Further complaints may be also be made to the EPA's Environment line.

Figure 11 Annual electricity consumption for the reporting Councils



As one of the highest sources of greenhouse gases that Councils may have a direct impact on, electricity consumption is an area for priority action within many of the reporting Councils. While there are links between the number of premises and the amount of electricity consumed (**Figure 11**), a range of factors in energy management also impact on this relationship. Tools such as power factor correction, energy efficiency measures and other demand management processes can significantly reduce the ratio of electricity use to number of facilities. Further investigation as to the direct link between the number of premises and the amount of power use is required. It is also noted that while most Councils have access to this information, there is a data gap for some Councils in this indicator. Further studies would enable this data to provide a carbon footprint measure for the reporting Councils and therefore a measure of climate change impacts.

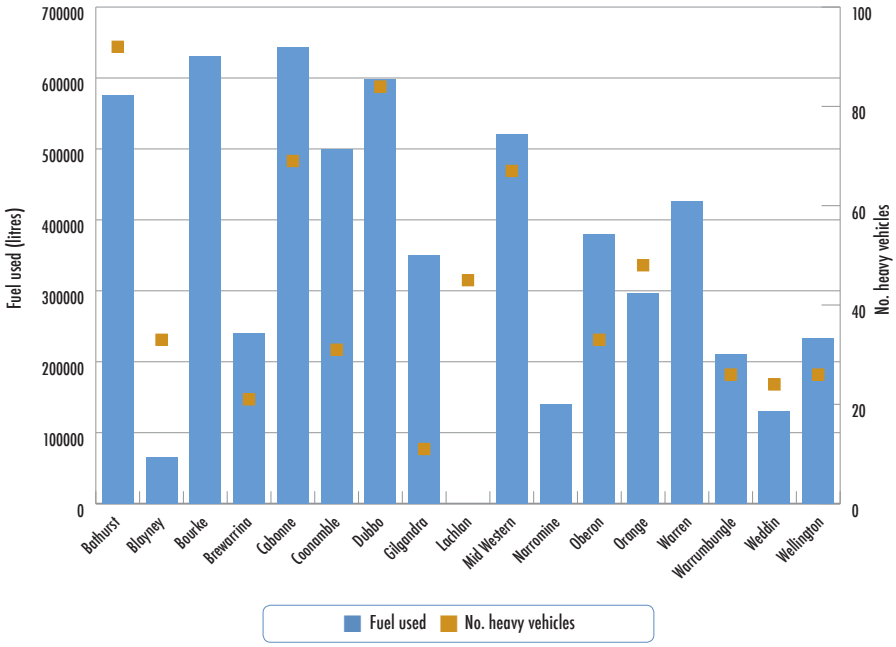
Figure 12 Annual gas consumption for the reporting Councils



As with electricity, the use of gas provides an indication of contributions made by Councils to greenhouse gas emissions. As natural gas generally has a lower carbon footprint (less emissions per mega joule) changes to the numbers of premises using electricity or gas could give potential greenhouse emission reductions. Orange City Council has a comparatively high number of premises using gas and a cold climate. This may contribute to the high amount of gas used. It is noted that natural gas is not available across the whole reporting area.

Councils may also purchase accredited greenpower products for both gas and electricity, where the product is sourced from renewable energy sources such as wind power. However, as most Councils currently have a data gap in this area, it may be included as a future indicator.

Figure 13 Heavy fleet fuel consumption



As with electricity and gas consumption, heavy vehicle fleet fuel use is a significant source of emissions for both greenhouse gas and atmospheric pollutants. As heavy fleet typically uses diesel fuel, emissions may include a range of particulates which have both human health and environmental impacts. As fleet vehicles are replaced, energy efficiency measures can be implemented to reduce this impact, including process management (reducing the number of vehicles) and engine efficiency technologies. The data shown for fleet fuel use shows that for most Councils, the use of fuel is between 20,000 and 50,000 litres per year, which has the potential to cause significant impacts on the atmosphere (**Figure 13**).

3.3 What is our response?

Fires

While fires are regulated by both pollution and burning regulations, education plays a key role in the response of Councils to this issue. DECC has produced a woodsmoke resource kit for Council officers, targeting improvements in residential wood fire use to limit smoke. Council officers have powers under the *PoEO Act 1997* to issue notices regarding smoky fires. Some Councils, such as Bathurst, are also offering rebates to encourage householders to upgrade their older wood heaters to more efficient forms of heating such as gas.

Hazard reduction burns and limiting the impact of smoke from these is managed by Bushfire Risk Management Plans, developed by the local Bushfire Management Committee (BFMC). The BFMCs are comprised of local land managers including Councils, National Parks, Department of Lands and the Rural Fire Service.

These plans now include assessment and management of environmental assets (threatened and vulnerable species, significant flora and fauna), as well as human settlement (buildings, properties, houses), economic assets (such as primary production land, commercial forests or tourist destinations) and cultural assets (Aboriginal or non-Aboriginal heritage areas and sites). Education is also very important in reducing this impact, and the media is used in peak seasons to raise awareness of fire risks (advertising, radio announcements, television advertising, risk indicators).

Emission of Air Pollutants

The majority of emissions are regulated by the *PoEO Act 1997,* and while Councils have some control over licensed premises in the local government area, many emission sources are managed by State regulation. For example, while motor vehicles continue to contribute a significant source of atmospheric emissions, fuel standards and vehicle technologies are set by various State and Federal guidelines.

Councils may also respond to air quality complaints and issue notices or warnings under the *PoEO Act 1997,* although few Councils record the number of air quality complaints made. Little data is recorded on the type of complaint (whether odour or smog etc). DECC has acknowledged that further support is required for Councils to have a role in air quality management, particularly outside of the greater metropolitan area where data is not available from the Daily Regional Air Quality Index (apart from the recently installed Bathurst monitoring site). DECC has developed education and support material for Council staff to assist with air quality issues, which is available at www.environment.nsw.gov.au/air/lgaqt.

Greenhouse Gas Emissions

Climate change and greenhouse gas emissions will play a significant role in the future, as Councils are already faced with growing community concern and awareness of this issue as well as increasing energy costs.

Recently proposed National Emissions Trading Schemes (ETS), designed to limit the amount of greenhouse-causing emissions, will impact on Council operations particularly in the areas of waste, energy and waste water treatment. It is not expected that the ETS (known as the Carbon Pollution Reduction Scheme) will commence until 2010, however new legislation in the form of the National Greenhouse and Energy Reporting System (NGERS) may require some Councils or facilities to collate and report on greenhouse emissions by June 2009.

Several Councils in the reporting area have undertaken work in this area through adoption of programs such as Cities for Climate Protection (CCP). This is an international milestone based program that focuses on auditing a Council's emissions and setting targets for emission reductions. Dubbo has reached CCP Plus and Mid-Western has completed Milestone 1. More recently launched, Planet Footprint is a data compilation and reporting program for Councils that allows them to use the data in several ways – identifying the locations of peak use, improving efficiency, or targeting emission reduction. Bathurst, Orange and Dubbo are members of the Planet Footprint program.

Several Councils also participate in GreenFleet programs through their vehicle leasing companies, which allow the lease company to offset the carbon emissions of vehicle fleet through coordinated tree planting programs operated by GreenFleet (no data is available on the number of Councils participating at present).

Several community action groups have formed in the reporting region to promote climate change issues and actions that the community can take to reduce carbon emissions. These include BCCAN (Bathurst Climate Change Action Network) and working groups under existing environmental committees, such as Central West Environment Council and Environmentally Concerned Citizens of Orange (ECCO).

Although the agricultural sector is not currently proposed to be in the ETS, this sector is starting to address greenhouse emissions through voluntary programs such as 'Carbon Cockies'. These farmers ('cockies') are implementing farm management systems to profitably manage carbon through sequestration of soil carbon and other techniques. The Central West CMA, in conjunction with the Central West Conservation Farming Association, hosted a Carbon Farming Expo in Mudgee (Mid-Western Regional Council) in late 2007 to promote methods of carbon farming. At this Expo the first annual 'Carbon Cocky Competition' awarded several local farmers who have implemented carbon reduction programs (Central West CMA, 2008).

Climate change and greenhouse gas emissions will play a significant role in the future, as Councils are already faced with growing community concern and awareness of this issue as well as increasing energy costs.

BIODIVERSITY

4

Biological diversity, or biodiversity, is defined as:

'The variety of life forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems they form. Biodiversity includes genetic diversity, species diversity and ecosystem diversity'

NSW Government, 2008

Biodiversity is essential to functioning ecosystems which maintain important processes on which all life depends. Biodiversity also has an intrinsic value and as such conservation of biodiversity is one of the primary principles of ecologically sustainable development (Australian Government, 2008). Biodiversity indicators have been selected to measure and gauge local and regional issues of noxious weeds and pests, Landcare and related activities and the condition of threatened species and ecological communities

What are biodiversity resources?

The planet has a wide range of organisms that live in complex interactions, both with the natural and built environments. All of the forms of life are connected in webs known as ecosystems which depend on species and other ecosystems for survival.

These ecosystems are dynamic and change over time – both short term changes in response to events (such as populations reducing in a bushfire or drought) or long term changes such as evolution or climate change.

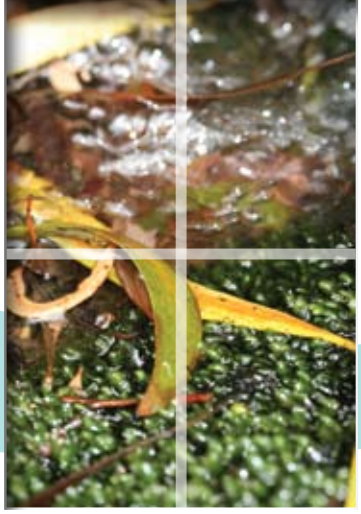
There is a wide variety of ecosystems across the Central West, formed by interactions across a range of factors including soils, urban development, local climate, vegetation types, and disturbance by activities such as farming and water availability.

Why is biodiversity important?

Biodiversity, as with land and atmosphere, provide important resources that we need to survive, such as oxygen and water cycles, growing foods and forests (timber) and even bacteria keeping the soil healthy. Most of these resources are at scales that we cannot see and may extend around the world (such as water cycles) or be limited to a single place or event (such as regeneration after bushfires).

The values of biodiversity extend beyond the catchment boundaries, providing national and international benefits. Examples of biodiversity services and values are provided below (EPA, 2003).

Biological control and pollination
Record of natural history
Food, medicines, timber and industrial products
Seed dispersal and pollination
Ornamental plants and breeding stock
Eco-tourism
Genetic diversity
Carbon sinks and greenhouse gas absorption
Nutrient cycling, filtration and storage
Clean air and water
Ecological services
Water quality and flow eg. salinity control
Stabilising processes eg. Weather, climate
Pest and biological control
Healthy soils
Nature-based recreation
Visually pleasing aesthetics
Health and lifestyle
Science and education
Spiritual and cultural
Traditional owner values
Cultural identity associated with key species
Future resources



4.1 What are the pressures on biodiversity?

Land Clearing

Many species of plants and animals rely on specific habitats in order to survive. Once these habitats are lost or degraded through activities such as agriculture and development, weed invasion or inappropriate fire regimes, there is usually a significant effect on biodiversity. This may include loss of species or changes in species composition, such as vegetation communities.

All land managers in the Central and Western Councils, including the Councils, have a responsibility under the *Rural Fires Act 1997* to manage bush fire hazards on land under their care and control. This results in vegetative cover and density being reduced through prescribed burning and mechanical means. Such programs may be undertaken by Councils in co-operation with fire fighting agencies such as NSW Rural Fire Service and National Parks and Wildlife Service.

The removal of vegetation, whether individual trees or large scale (broad acre), land clearing on private property contributes to the changing character and viability of remnant vegetation and can dramatically affect the health of the landscape and local amenity. Information on the number or area of trees removed is not recorded by Councils, however the Central West CMA has approved a number of clearing Property Vegetation Plans (PVPs). The number of hectares affected by these PVPs is not available at present. Some land clearing is approved by Councils or the State Government under development applications, such as residential or industrial development (including mining). For example, Mid-Western Regional Council has several large mines which will include significant areas of clearing through approvals and expansions in the next few years.

Loss of Habitat

Terrestrial Habitat

Any decline in vegetation quality and/or density can have a direct impact on habitat and the ability of the local ecosystem to respond or adapt to pressures. This decline does not only result from the cutting down of trees. For example, along the edges of remnant vegetation weeds and pest animals will have a strong negative effect on habitat through increased disturbance, grazing and competition. These effects can impact on habitat along waterways, roads and fencelines. Other indirect impacts on habitat may be from the removal of hollow logs and dead trees for firewood or to promote 'clean paddocks'. This woody debris often provides significant habitat for a range of species such as reptiles, small mammals and birds. The removal of hollow trees and dead logs is listed as a key threatening process under the *Threatened Species Conservation Act 1995*. Cumulative impacts may also include removal of several smaller remnants, reducing connectivity across the landscape and preventing species from accessing resources, reducing genetic diversity and limiting habitat.

Small, isolated patches and thin corridors of vegetation are also more vulnerable to the impacts of disease, fire, inappropriate clearing and other forces, and tend to be less genetically diverse. When habitats decline, species compete for the remaining resources, causing populations to decline and lose genetic diversity. Habitat loss, and specifically habitat fragmentation, continues to be the major cause of species extinction.

Aquatic Habitat

There are many impacts on aquatic biodiversity through changes to aquatic habitat. Regulation and extraction of water reduces the available habitat for aquatic species, whether in wetlands, river systems or small streams. Barriers such as dams, causeways and weirs prevent fish passage, impacting on breeding habits, availability of resources such as food and preventing migration. Removal of snags also decreases instream habitat. Over fishing may have a localised impact on selected native species, particularly as drought and extraction causes a concentration of species in selected waterways. Introduced species and diseases can have significant impacts. For example, the effects of the carp, a pest fish, are well documented and include predation on native species, competition for resources and damage to the river and stream banks. In some areas exotic fish species, such as trout, have been released to improve recreational fishing. These species not only compete with native fauna for resources but may also prey on native species, increasing the impacts on stressed aquatic habitats.

Weeds and algal blooms also affect aquatic habitat through changing available food resources, loss of shelter by out competing reeds and sedges by species such as willows and changes in the composition of oxygen and nutrient balances and other effects.

Feral and Pest Animals

Introduced species such as rabbits have been shown to have a significant impact on biodiversity through competition for resources or predation. Rabbits are responsible for concentrated overgrazing causing loss of groundcover; they also cause localised erosion through burrowing. Another key predator is the introduced European (red) fox. The fox has predatory characteristics of both cats and dogs and has, along with rabbits, been declared a key threatening process across NSW under the *NSW Threatened Species Conservation Act 1995* (*TSC Act 1995*). The fox is highly adaptable and is widespread in both rural and urban areas and preys on a wide range of fauna including mammals, birds, reptiles and turtles.

What is a key threatening process?

A Key Threatening Process threatens the survival or evolution of a species, population or ecological community. Key Threatening Processes are declared under the Threatened Species Conservation Act 1995 and 31 have been declared for NSW. They are noted as having significant impacts across NSW.

DECC has developed (or is developing) threat abatement strategies and priority actions to reduce the impacts of these threatening processes. More information on key threatening processes is available at DECC's Threatened Species website, www.threatenedspecies.environment.nsw.gov.au.

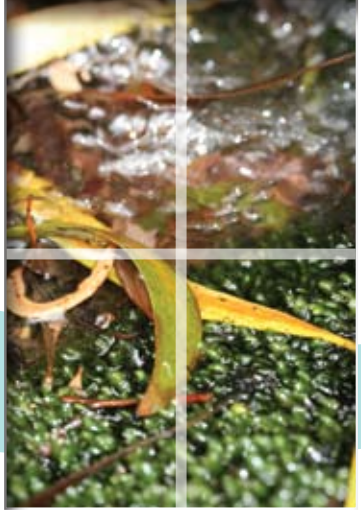
Other predators such as feral cats and dogs found throughout the reporting area create many problems for the natural environment. Cats hunt at all hours, especially at dusk and night. Their prey commonly consists of bats, possums, bandicoots, native rats and mice, birds, lizards and snakes. Cats also compete with native predators, such as the threatened Spotted-tailed Quoll and can carry bacteria and blood parasites which can be passed on to wildlife that have no resistance. Dogs also have a direct impact on remnant vegetation by preying on and harassing wildlife and disturbing burrowing fauna. Dogs regularly urinate on trees to mark out territory, sending out warning signals to native animals to keep away, and faeces are very high in phosphorus, promoting growth of exotic weeds and being a health hazard. Wild dogs also interbreed with the native dingo, reducing the viability of the native species. Dogs are responsible for attacks on stock including sheep.

Other pests listed as Key Threatening Processes include pigs, deer and goats, and the impacts of these may range from the spread of weeds, vehicle accidents and competition for resources to livestock and exotic disease spread, and fence and crop damage. Pigs cause direct disturbance to habitat through wallowing and rooting and are widespread across NSW. They also prey on plants and animals and have contributed directly to the decline of several species of frogs and birds. While goats are also widespread, they are more prevalent in the western, more arid areas of the reporting area. Goats browse heavily on some species of native plants, including endangered and threatened species, compete with native threatened species and also cause erosion, particularly on steeper slopes. Goats have also been declared under the national *Environment Protection and Biodiversity Conservation Act 1997* and a national threat abatement strategy has been developed and implemented.

Weeds

Weeds are plants whose growth and habit results in the loss of environmental, economic or social values. In the natural environment, weeds can out compete the native flora for resources including water, nutrients and sunlight, and can displace a range of species. Weeds vary in their impact upon the environment and are broadly grouped into two categories – environmental or noxious weeds. Environmental weeds are those plants that have or may have established self-propagating populations in areas of native vegetation, outside of their natural range. Noxious weeds are those that are declared under the *NSW Noxious Weeds Act 1993* and may be declared for the whole State or a local control area only. Noxious weeds must be controlled by the landholder.

Of particular concern in the reporting area is willow infestation along water courses and drainage lines. Willows are declared as a weed of national significance due to their prevalence and ability to spread. Willows have significant impacts on riparian habitat including erosion, shading of water surfaces, increasing nutrients, supporting pest species and out competing native species. A number of willow control programs and projects have been implemented by the Councils and private landholders across the reporting area to try and reduce the impacts of this weed.



Surface Water Runoff

Water runoff can transport pollution from sources such as sewage effluent, intensive agriculture (feedlots and irrigation) and fertiliser runoff. The increase in impervious surfaces from roads, buildings and other development increases runoff and decreases infiltration. Runoff collects and concentrates, generating large volumes of water with a high velocity, which erodes exposed soil and carries it into streams along with weed seeds and nutrients. Elevated nutrient levels in water and soil generally favour the growth of weeds over native plants in remnant vegetation. This can encourage weed infestations, particularly along waterways, and make it harder for local species to compete and survive. Many streams are rich in aquatic macro-invertebrates and poor water quality and sediment derived from stormwater can decrease stream biodiversity and alter habitats.

Fire Regimes

Many ecological communities that occur in the region are adapted to the periodic occurrence of fire. Many species require fire to stimulate and facilitate life cycle processes. Each community will have optimal fire regime thresholds that are influenced by the species that occur within it. The sustainability of both the community and individual species and populations can be dramatically influenced by the intervals, season and intensity at which fire occurs in those environments. As such, high frequency fire is listed as a Key Threatening Process under the Act.

Climate Change

Climate change has the potential to impact on a wide range of habitats, species and populations. Many species have limited tolerances to temperature and rainfall conditions, and even small changes in the climate may increase pressures on local ecosystems. In addition, while species and populations may normally be adaptive to some changes, the additional pressures of land clearing, weed invasion and other land use changes have reduced the ability of many species to adapt or migrate (AGO, 2003). The Commonwealth Scientific and Industrial Research Office (CSIRO) has modelled climate change impacts for the catchments of NSW (on behalf of the NSW Greenhouse Office) and notes that for the Central West CMA area, it is likely that the climate will be warmer and drier with more extreme heat waves, winds and fires. Some increases in seasonal rainfall may occur. These changes would have 'significant impact on the catchment's plants and animals...and lead to changes in the distributions of tree species, possible invasion by pests and changes to the habitat' (CSIRO, 2007).

Other pests listed as Key Threatening Processes include pigs, deer and goats, and the impacts of these may range from the spread of weeds, vehicle accidents and competition for resources to livestock and exotic disease spread, and fence and crop damage.

Pigs cause direct disturbance to habitat through wallowing and rooting and are widespread across NSW.

4.2 What is the state of our biodiversity?

Land clearing remains a significant impact on biodiversity, despite changes to State legislation such as the introduction of the Native Vegetation Act 2003.

Land Clearing

Land clearing remains a significant impact on biodiversity, despite changes to State legislation such as the introduction of the *Native Vegetation Act 2003*.

'Since 1788, at least 61% of the original native vegetation of NSW has been cleared, thinned or significantly disturbed. This has primarily taken place to support agriculture, but more recently also for residential, commercial and industrial uses... Clearing rates vary across the State with the highest levels in the wheatbelt of the Central West.'

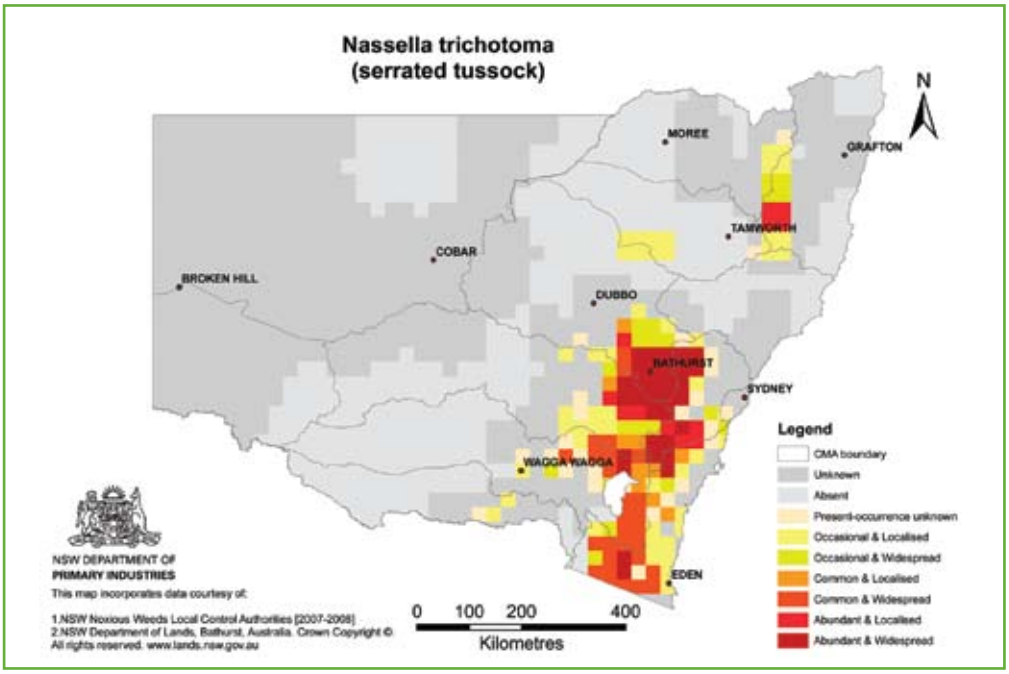
NSW State of the Environment 2006 (DECC)

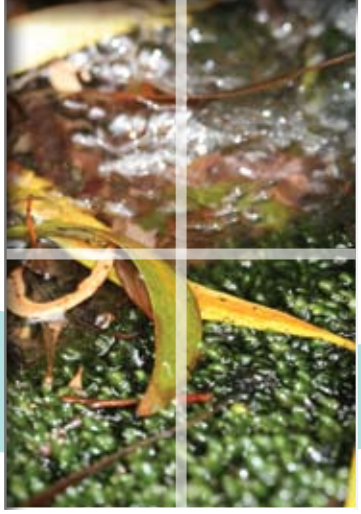
While approvals for clearing native vegetation have decreased since the introduction of the Act, significant areas are still cleared illegally or through exemptions under the Act, known as routine agricultural management activities. Property Vegetation Plans may reduce net clearing by allowing for the CMAs to approve some clearing when combined with a complete property management plan for vegetation.

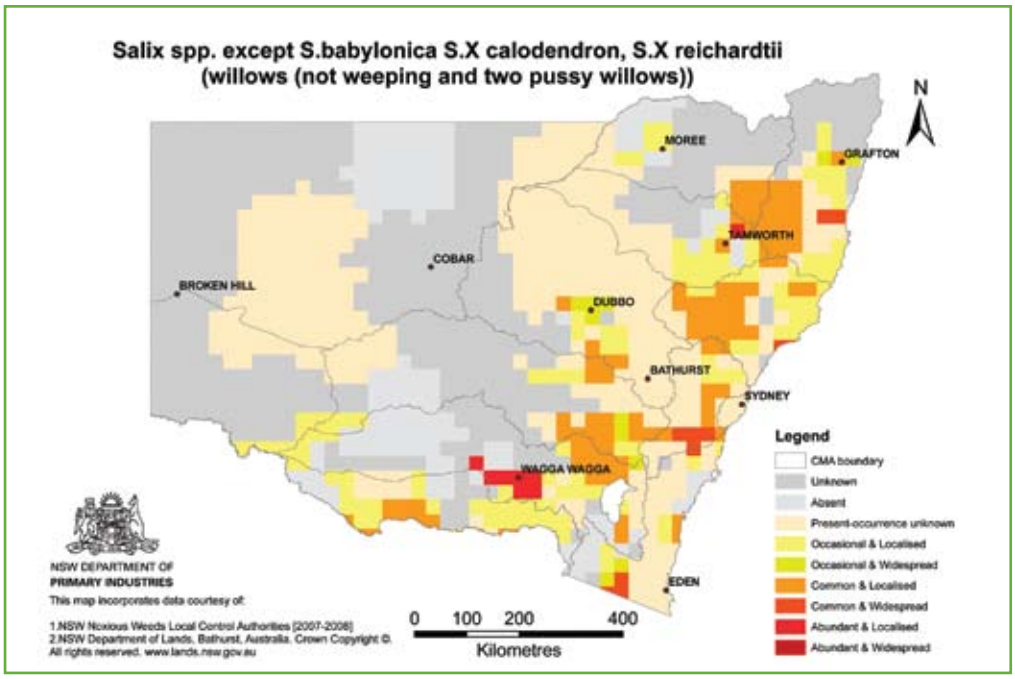
Weeds and Fires

The reporting area has 112 declared noxious weeds (Department of Primary Industries, 2008), and a significant number of environmental weeds present; however no reports on areas affected or number of environmental species are available at present. Noxious weeds declared for the reporting Councils are listed in Appendix 3.

Figure 14 Examples of NSW weed maps







The Department of Primary Industries has recently undertaken weed mapping for the State for a number of significant weeds. Examples of these maps are shown in **Figure 14**. These indicate approximate abundance of weeds across the State, allowing control authorities to target those that are more abundant and widespread or may cause more environmental or agricultural harm.

Table 6 Bushfire events for 2006-2007

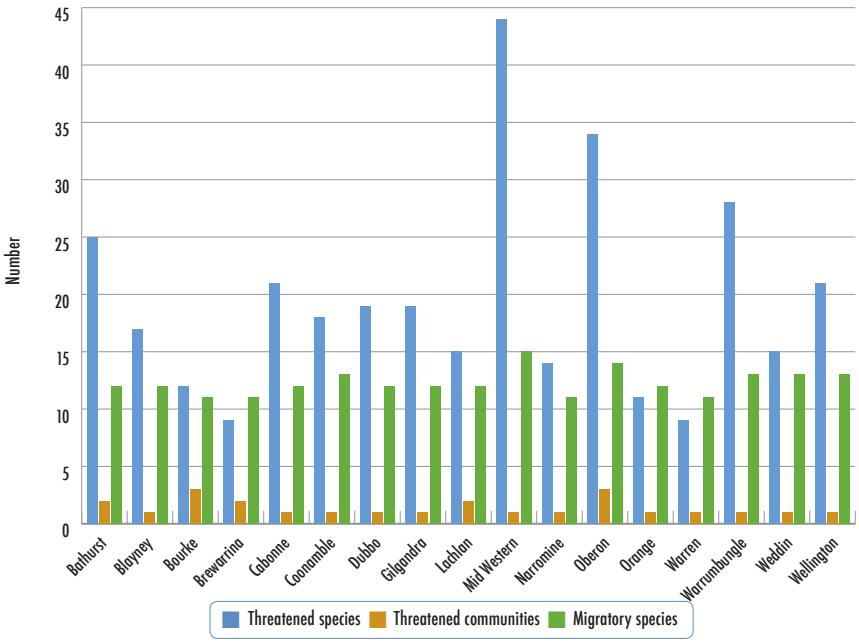
Region	Team	Councils	Events
North	Castlereagh	Warrumbungle, Gilgandra	Very dry year causing at least six major Section 44 fires; crews required from other areas
West	North West	Coonamble, Warren	18 strike teams in place, very dry year with a high number of Section 44 fires across the region
	Orana	Narromine, Wellington, Dubbo	
	Canobolas	Blayney, Orange, Cabonne	
	Mid Lachlan	Weddin	
	Cudgegong	Mid-Western	
	Mid Lachlan Valley	Lachlan	
	Barwon Darling	Brewarrina, Bourke	
East	Chifley	Bathurst, Oberon	Several Section 44 fires in Chifley area

Total incidents across State 20,186 (3361 bush fires, 3420 grass fires, 929 building fires, 1423 vehicle fires, 3415 motor vehicle accidents, 1874 false alarms and 5764 other)

Bushfires, whether naturally occuring (lightening, weather events) or man-made (arson, cigarettes, accidents), have a significant impact on biodiversity. This may be a negative or positive impact depending on the local species and community. During the reporting period, there were numerous incidences of fire involving vegetation and attended by the NSW Rural Fire Service. Unfortunately, estimates of the total area of burnt land are not available, and therefore the pressure on biodiversity is not known. It is noted that the Rural Fire Service Annual Report 2006 – 2007 summarises fire events for the regions. This is the current annual report as data has not been compiled for the 2007-2008 period at the time of publication. This report summarises the instances of declared emergency fires under Section 44 of the *Rural Fires Act 1997,* and a summary of this is shown in **Table 6**. Under this declaration, the Rural Fire Service Commissioner takes control of bush fire fighting and prevention and may implement any measures necessary to control that fire. This is typically if the fire has or is likely to become too big to control or the climate conditions are likely favour such fires or it is not being effectively controlled.

Threatened Species

Figure 15 Number of national threatened and migratory species and threatened communities listed for each LGA



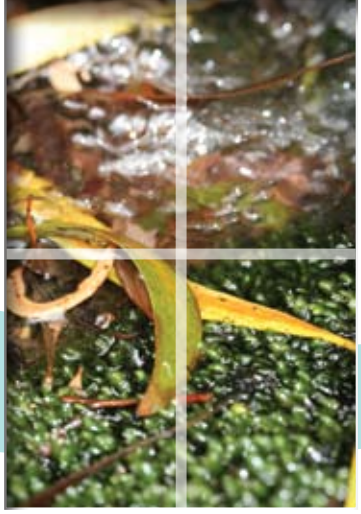
Environment Protection and Biodiversity Conservation Act, DWEHA, 2008

The numbers of threatened species do not reflect the biodiversity of an area, being so dependant on the local ecosystem and human impacts. For example, a high number of threatened species may indicate that an area is highly diverse and has significant habitat; reciprocally, it may indicate that there has been a high level of human impact. A future area of research may be to determine the proportion of threatened species compared to total number of native species within each LGA.

Grassy Box Woodland is one of the most threatened communities in the State (1% of original extent remaining) and is listed on both State and national registers. It was widely found across the Central West region however the high level of clearing linked to agricultural land use in the reporting area has caused significant decline.

Threatened species listed under State legislation are listed in Appendix 2. In the Central West catchment, there are 108 species, zero populations and eight ecological communities listed under this legislation (DECC, 2008). It is noted that species and communities may be listed on both the State and Federal registers, such as the Grassy White Box Woodland (Yellow Box, White Box, Blakely's Red Gum community) if they are particularly significant or affected across a very wide area. The number of species listed under the national legislation is indicated in **Figure 15** above.

There are a number of SEPPs that apply across all or part of the reporting area. These include SEPP 44, Koala Habitat Protection, which applies to the LGAs of Bathurst, Blayney, Bourke, Brewarrina, Cabonne, Coonamble, Gilgandra, Mid-Western, Narromine, Oberon, Warren and Weddin. This SEPP outlines assessment of potential koala habitat and development controls that must be applied. Other SEPPs that may apply includes SEPP 52 (farm dams and other works in land and water management plan areas) and development specific controls such as mining, petroleum production and extractive industries.



Reserves

Figure 16 Area of reserved land relative to total Council area

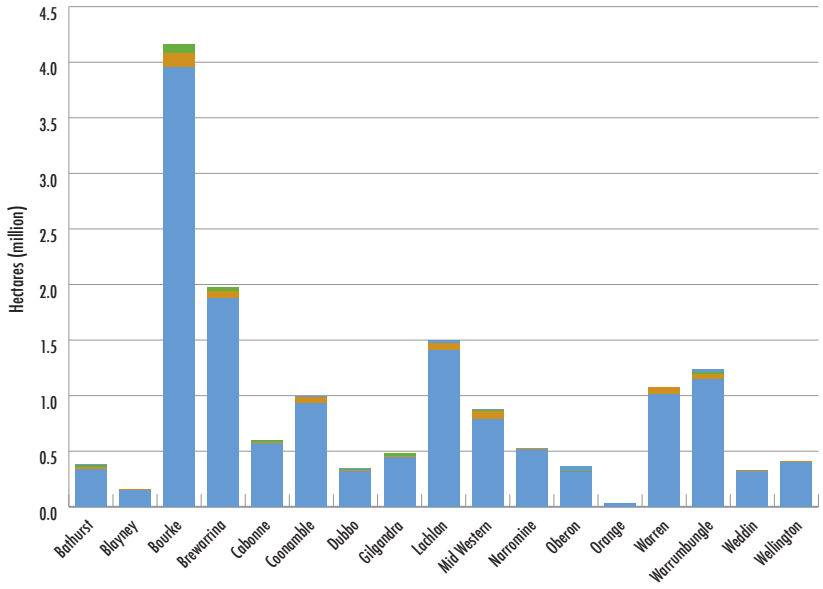
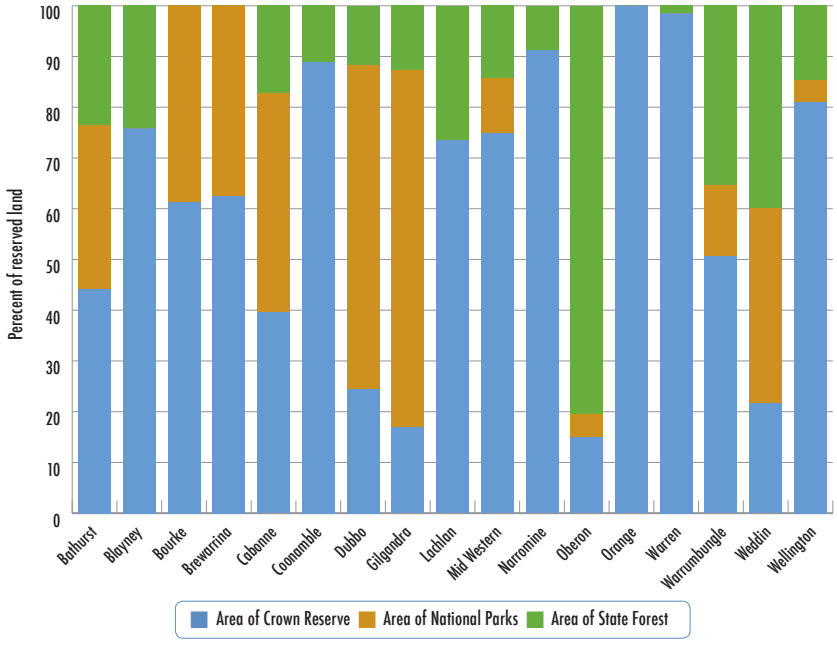


Figure 17 Areas of reserve within the Council area



The area of land that is placed under protection, or reserved, may be considered an indicator of the amount of protected habitat available in the Council area. However, it is noted that many types of habitat are not well represented in the reserve system, as reserves tend to be on land that has a lower economic value (ridges, slopes, poor soils) rather than land that has representative (ecological) significance. The approximate area of State Forest and National Park in the reporting Councils is 1.5 million hectares (this includes some areas of reserve which extend past the Council boundary if the reserve is mostly within the Council area) and Crown Reserve area 1.6 million hectares, which includes travelling stock reserves, community reserves such as Schools of Art, and other crown public reserves. The total reserve area is therefore approximately 3.1 million hectares.

Land is reserved for a range of purposes and includes a wide range of ecosystems. For example, the reserved land under State Forests includes both native forests and plantations, while the National Parks include native forests, recreation areas and wilderness. The environmental value of these reserves will depend on the type of vegetation, use of the reserve and management of the reserve and varies greatly across the reporting area. In general, they do provide larger areas of habitat in what is otherwise a highly cleared landscape.

Figures 16 and **17** show that there is a significant difference between Councils in the ratio of different types of reserved land. For example, Dubbo and Gilgandra Councils have comparatively large areas of national park, reflecting the recent additions to Community Conservation Areas, while in Cowra, Orange and Narromine the most significant reserves are Crown reserves. As these provide different levels of protection for environmental values, this information may indicate parts of the reporting area where habitat protection should be a priority for future management.

4.3 What is our response?

Land Clearing

The outcome of these changes has been to reduce the number of clearing approvals over the past two years.

There have been significant changes to native vegetation legislation at the State level, with the Native Vegetation Reforms addressing vegetation management from clearing approvals to property vegetation plans. The outcome of these changes has been to reduce the number of clearing approvals over the past two years (NSW SoE, 2006). No data on the amount of illegal clearing is available for the reporting period. Following the changes to legislation, the NSW Audit Office (2006) undertook an audit of compliance under the Act and concluded that

'Approximately 74,000 hectares of native vegetation were cleared in 2005, made up of 44,000 hectares approved clearing and 30,000 hectares illegal clearing. Most of the illegal clearing was on the previously uncleared western edge of farmland in the State...Most land clearing in NSW was done before regulation began in 1995. However farmers with uncleared land at that date were affected by the legislation. A minority of these have cleared illegally, particularly in western areas. Only a small number of prosecutions for illegal clearing have been undertaken under the *NVC Act 1997* in the period 1998 to 2005.'

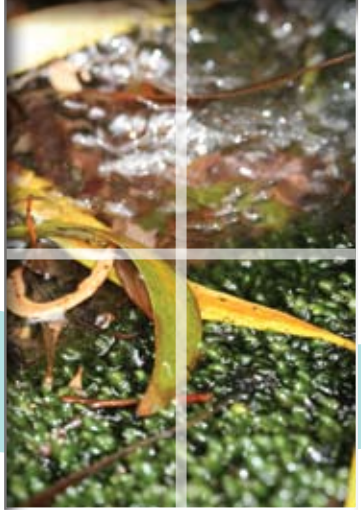
NSW Audit Office 2006

The audit did note that as the changes were still being implemented it was expected that compliance would improve notably over the 2007 financial year; however no further audits have been conducted by the office at the time of publication.

Councils also control clearing of vegetation in urban areas, where the *Native Vegetation Act 2003* does not apply. Development consents allow for minor clearing for housing, business and industrial development as well as fire protection zones. This is regulated by environmental impact assessment requirements of the *Environmental Planning and Assessment Act 1979,* which outline information addressing environmental impacts (Statements of Environmental Effects or Environmental Impact Assessments) to be provided with development applications. Development consents may include conditions to mitigate land clearing impacts.

At the State level, the Biobanking Scheme, administered by DECC, has recently been introduced (2008). This scheme allows for biodiversity offsets of clearing for development. As it was only introduced in 2008, no data on the area of vegetation affected is available for the reporting period.

Rehabilitation projects have been developed to help reduce the impact of land clearing on biodiversity, by organisations including Councils and Landcare. Several projects have been implemented during the reporting year. For example, Orange City Council supports both Schools Day (400 trees planted at Somerset park over 0.5 ha by five schools) and National Tree Day (1000 trees planted at Hinton Reserve over 3 ha by 53 community members), and also works in partnership with both Bathurst Regional Council and Conservation Volunteers Australia on a community rehabilitation program, known in Orange as 'Parks Alive'. The Bathurst program is known as 'Waterway Warriors'. Brewarrina Shire has rehabilitated an old landfill site with 500 native trees; Coonamble Shire has planted some 3,000 tree across 6 ha; Dubbo has revegetated 15 ha of land, Lachlan 19 ha and Warren 10 ha; while Mid-Western has planted 500 trees along Lawson Creek.



Habitat and Feral Animals

Many of the responses aimed at reducing the impacts of landclearing, outlined above, also have a positive effect on habitat, through rehabilitation programs, linking corridors particularly along creeks and rivers, and reduction of weeds.

The Central West CMA Annual Report 2006-2007 notes that across the catchment the following achievements have been made to improve biodiversity outcomes. These programs target high conservation value vegetation, which includes threatened communities such as the White Box – Yellow Box – Blakely's Red Gum endangered ecological community.

Table 7 Outcomes from Central West CMA funding programs

Target area	Output	Number of projects
Riparian management	89 km	17
In-stream habitats	20 km	11
High conservation value vegetation protected	2,899 ha	28
Revegetation of high conservation value vegetation	63 ha	8
High conservation value vegetation under plans of management	1,084 ha	4

At the State level, DECC coordinates the development and implementation of Recovery Plans for threatened communities and species. Several recovery plans were placed on public exhibition during the reporting period, although few directly relating to the reporting area.

Local activities may also target restoration of both habitat and species. Many Councils have an active community engagement and education program for biodiversity restoration, from tree planting (outlined in 4.3, above) to general volunteering in the environment. Volunteer hours vary across LGAs from 5537 hours in Dubbo, 400 hours in Narromine, 1600 hours in Orange to 31 hours in Coonamble.

This has significant value to the Council as well as a large role to play in encouraging the community to take active care of the environment. Volunteer programs cover a range of activites and include the general community, schools, interest groups and some businesses. For example, fishing groups are often involved in assisting with fish restocking programs to encourage healthy aquatic habitats that also may allow for recreational fishing. A summary of programs is listed in **Table 8**.

Table 8 Fish restocking activities

Council	Restocking program
Bourke	Yellowbelly and Murray Cod released at Louth
Brewarrina	Murray Cod, Golden Perch and Black Bream (several thousand) releases
Dubbo	10,000 Murray Cod and 22,000 Golden Perch released in two sites on the Macquarie River
Narromine	9090 Murray Cod released at Narromine boat ramp
Orange	300 Murray Cod released in Gosling Creek Reservoir; 3000 Golden Perch, Brown Trout, Rainbow Trout released in Gosling Creek Reservoir and Lake Canobolas
Warren	10,000 Murray Cod released at the Warren and Raby boat ramps

The Rural Lands Protection Boards carry out annual pest animal programs including wild dog and fox baiting, plague locust control, rabbit control and various other programs in conjunction with private landholders. Working with the Department of Primary Industries, the RLPBs collaborated on a detailed study of pest animals in 2006, reporting that the primary pests in agricultural regions of NSW are feral pigs, feral goats, wild deer, foxes, rabbits and wild dogs/dingoes (DPI, 2007). Less than 0.3% of NSW is considered free from these species. Councils may support or cooperate with these programs and promote them through education. For example, Bourke Shire has an eradication program across its reserves; Brewarrina Shire has programs for feral pigs, fox baiting, wild dog and general pest management policies; Cabonne Shire targets rabbit control and Dubbo City undertakes starling control in the city and fox baiting across its reserves.

Weeds

Noxious weed control is the responsibility of the local control authority. In many cases this is the local Council, however there are also two County Councils in the reporting area, Upper Macquarie (Bathurst, Blayney, Lithgow and Oberon) and Castlereagh Macquarie (Coonamble, Gilgandra, Walgett, Warren, Warrumbungle). These provide weed control services for the Councils and employ weeds officers to undertake the works, funded by rates from the member Councils. In addition, committees comprised of the Councils, County Councils and other land managers work to share information and planning, such as Macquarie Valley Weeds Advisory Committee and Lachlan Valley Noxious Plants Advisory Committee. These committees work to ensure collaborative efforts on key weed species and also provide an information channel to State bodies such as the NSW Noxious Weeds Advisory Committee.

While data on areas of weeds treated is not complete and is highly variable, Brewarrina has treated 20ha of weeds; Dubbo officers have treated 944 ha of reserves and 2,700 km of linear road reserve; Lachlan lists 450 ha treated, Mid-Western 2309 ha, Narromine 20 ha, and Orange lists 4 ha at Hinton Reserve and Lake Canobolas.

Councils also undertake programs to control environmental weeds and work to educate the local community in the importance of such control. For example, many Councils will support WeedBusters Week activities, a national program to focus community education and involvement in weed management. The NSW Department of Primary Industries also promotes school education programs such as Weed Warriors and Weed Attack, aimed at introducing students to weed science as part of the curriculum (DPI, 2008).

While data on areas of weeds treated is not complete and is highly variable, Brewarrina has treated 20ha of weeds; Dubbo officers have treated 944 ha of reserves and 2,700 km of linear road reserve; Lachlan lists 450 ha treated, Mid-Western 2309 ha, Narromine 20 ha, and Orange lists 4 ha at Hinton Reserve and Lake Canobolas.

CASE STUDY

Invasive Native Scrub

Balancing science and landholder knowledge in the Bogan Shire

Research sometimes has the unfair reputation of being academic and impractical. However, a collaborative program happening around Nyngan and far west NSW is demonstrating how science and research can take account of paddock-based knowledge

The Central West and Western CMAs are coordinating a program of research on the serious issue of Invasive Native Scrub (INS, also known as woody weeds) and have been working with landholders in the Bogan and surrounding local government areas.

INS is dense and encroaching growth of native trees and shrubs, which can lead to a range of environmental and production problems. INS areas are often marked by a lack of groundcover, which can result in lower habitat diversity and biodiversity; increased soil erosion; reduced pasture production; and limited farm profitability.

The work being carried out by the CMAs and project partners will lead to a resource to help the community, CMAs and government better manage this issue. The individual projects address complex issues such as managing soil erosion in INS sites; managing INS to improve soil health, short-term cropping as a treatment method; burning as a management technique; classifying and mapping INS; biodiversity; and a range of others.

The landholder community is a key stakeholder in this work and have been actively involved in the research process. This adds a new perspective and helps make sure that end-resources are practical and can be used in the paddock. The value of their contribution has been recognised at a number of levels.

The program's overseeing advisory group includes three landholders with extensive INS experience. Their involvement has made the difference with community engagement, project design and the practicality of information coming from the program. Their input into the program and links with the community remain one of the program's key strengths.

Landholders' views, knowledge and experiences have also been recognised formally through a project specifically documenting this information. Around 20 landholders with decades, and often generations, of experience in managing this issue have participated and lent their experiences.

There has been strong community interest in this work. People have actively participated through attending workshops and field days; providing access to study sites, assisting researchers with their work; and even supplying rain water for a rainfall simulator!

For further information about the research program and latest updates visit www.cw.cma.nsw.gov.au.

Top: Rainfall simulator – INS research in action near Nyngan – the rainfall simulator measures water infiltration and run-off in different study areas.
Middle: A typical INS site in Western NSW.
Bottom: INS sites can often have a lack of groundcover and lead to environmental issues such as erosion.

Local activities may also target restoration of both habitat and species. Many Councils have an active community engagement and education program for biodiversity restoration, from tree planting to general volunteering in the environment. Volunteer hours vary across LGAs from 5537 hours in Dubbo, 400 hours in Narromine, 1600 hours in Orange to 31 hours in Coonamble.

CASE STUDY

Cabonne Council

Molong Creek Aquatic Instream Habitat Restoration Project

The Central West CMA and Cabonne Council formed a partnership with local landholders and community groups to improve riparian landscape function within the highly degraded Molong Creek.

The project involved the placement of large woody debris within existing pools to improve structural elements to an aquatic system that had become dysfunctional due to the impacts of exotic vegetation. This work compliments previous willow removal projects.

Cabonne Council and the Central West CMA view this project not only as restoring riparian landscape function but value adding to the general community as a demonstration reach to illustrate the links of a functional riparian landscape (riparian vegetation – large woody debris – water quality- functional process).

The placement of large woody debris in existing pools represents best practice on restoring riparian landscape function and will have a positive effect on the life cycle of the listed threatened fin species (Olive Perchlet, Purple Spotted Gudgeon, Silver Perch, Trout Cod and resident populations of River Blackfish) as well as those common aquatic species recorded in Molong Creek.

The preferred habitat requirements of the listed threatened fin species and common aquatic species correspond with what is now evident in the Molong Creek, flowing water, deep pools with large woody debris and regeneration of native riparian vegetation.

The completed project is considered to be consistent with the objectives of a recovery or threat abatement plan by expanding and improving habitat values which contribute to the continuing conservation of aquatic populations within the Molong Creek.

Placing woody debris in Molong Creek

WATER

5

Many towns across the reporting areas have been on medium to high level water restrictions for a period of years, with some under emergency water controls due to low dam storage levels.

This chapter reports on the quality of receiving waters and the consumption of potable water in the Central West region. Indicators have been selected to measure and gauge issues of water quality and water consumption. In this section 'water' refers to the rivers, aquatic habitats, creeks, wetlands, groundwater, dams, stormwater, potable water and the catchment activities which may impact upon them. Several water authorities exist across the region, with many local Councils responsible for aspects of surface water management as well a smaller number of County Councils as independent water authorities.

Water is essential for sustaining life. Water exists in our environment in many forms and is constantly moving as part of a dynamic system called the 'water cycle'. Water comes to land through rain, flowing over the surface of the earth, pooling in puddles or lakes, moving through creeks, streams and rivers and also sinking into soil (infiltration) and replenishing groundwater. Water from the soil is taken up by plants and used by them to grow. Water leaves plants in the biological process of transpiration and evaporates from soil, freshwater bodies and the ocean to return to the atmosphere, ready to make rain again.

Waterways across the catchment are important for many reasons:

- They act as a 'barometer' for the whole environment. Most activities that occur on the land are ultimately reflected in the health of waterways.
- They support a diverse range of ecosystems.
- The vast majority of our streams and creeks ultimately enter, and impact upon, the integrity of internationally important wetlands such as the Macquarie Marshes.
- Many waterways are in, or discharge into, drinking water catchments.

Climate change may have a significant impact on water resources and the long term drought has been noted as a potential indicator of climate change. These impacts are further discussed in Atmosphere (Chapter 3) under the heading of Climate Change.

With the development of the Central West CMA's Catchment Action Plan (2007), there is greater responsibility as well as greater opportunity for Councils, government agencies and the community to work collaboratively to look after our waterways.

5.1 What are the pressures on water?

Surface Water Extraction

Continued demand for surface water and the lack of rainfall (drought) has placed significant pressure on not only town water supplies but also water licences and allocation for agriculture and industry. Many towns across the reporting areas have been on medium to high level water restrictions for a period of years, with some under emergency water controls due to low dam storage levels. These include Orange. Few rivers in inland NSW are unregulated with most modified in some way by human activity.

Irrigation also places significant pressure on water resources. While many irrigators have had little to no allocation over the past year, over allocation of water licences has seen additional stress placed on aquatic habitats such as the Macquarie Marshes despite the requirement for environmental flows. Studies for the Sustainable Rivers Audit, undertaken by the Murray Darling Basin Commission clearly indicated that the more regulated the river system, the more degraded the habitat. Weirs, dams and floodgates all affect fish movements, reduce water quality and impact on ecosystems.

- Regulation of river flows can cause a range of impacts including:
- Introducing barriers to fish (and other species) moving through the habitat.
- Reducing the peak and trough effect of rainfall and minor floods, areas without fresh water for longer periods.
- Changing seasonal variation.
- Reducing flows across the landscape.
- Reducing the amount of water in flood events, limiting the area affected, time affected and depth of water.
- Changing water temperatures through shallow water (usually warmer) or dam releases (usually colder).
- Increased channelisation and isolation of rivers from the floodplains.

Water Quality

The reduced quantity of water in streams and rivers has increased the stresses placed on these systems by discharges such as sewage effluent and trade waste. DECC notes that:

'Ongoing drought conditions occurring across much of NSW since 2003 have limited water availability. This has contributed to a decline in river health indicators such as macroinvertebrates across many areas of NSW. In the most recent assessments, only 22% of macroinvertebrate sample sites were considered to be in good condition, compared to 56% of sites reported in SoE 2003.'

NSW State of the Environment, 2006

Water quality is affected by both point source (premises) pollution and diffuse source pollution (run-off from a range of activities). Where there are no reuse programs in place sewage treatment plants (STPs) and industrial premises are typically the highest contributors of point source pollution in the reporting area. The level of treatment of sewage will reduce the effect of the pollution, however most effluent will have a level of nitrogen and phosphorus. These can impact on the local ecosystem, including encouraging algal blooms such as blue-green algae. STP pollution may also peak during storm flows when overflows from drains and holding ponds may occur.

Agriculture can contribute significant loads as a diffuse source, through fertilisers, pesticides, sediment and manures. This can contribute nutrients such as nitrogen and phosphorus, pathogens, organic compounds (some toxic) and suspended solids to waterways. This can occur both from runoff across the landscape and also where stock have uncontrolled direct access to waterways. Urban areas may also contribute these pollutants particularly during storm flows, and add oils, grease, metals and further pathogens to the water.

Groundwater Extraction

NSW has a high level of groundwater resources, and they provide a vital resource to the community and environment. The interaction between ground and surface water systems is not well understood or recognised. The State Government is undertaking studies to try and determine the nature of the interactions and therefore the impacts that may occur on each system. Many towns in the reporting area rely on groundwater as the principal water supply and many wetlands, lakes and marshes are also dependant on groundwater systems. The demand for groundwater extraction, particularly for irrigation, is increasing and placing additional pressure on aquifers and ecosystems.

Salinity

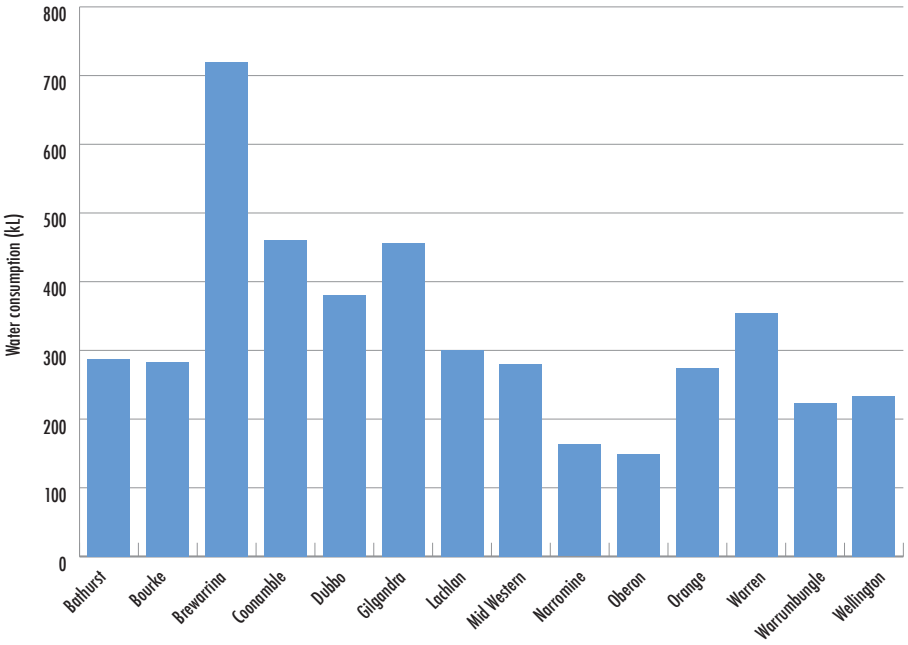
Land use has a significant impact on the level of salinity through removal of vegetation, irrigation and discharges of saline water. While geology and topography also affects salinity, the land use is the primary factor that affects mobilisation of salts into waterways and through soils. Salt generally degrades aquatic habitats as well as adversely impacting on soils and the crops and vegetation utilising those soils. Further discussion on these salinity impacts is in Land (Chapter 2). Drought conditions can limit the amount of salt entering waterways however the levels can still rise above World Health Organisation desirable limits for drinking water, which is 800 EC. **Table 10** indicates some of the river salt levels for the reporting area across a period of five years or more.

5.2 What is the state of our water?

As the water cycle is complex and a range of pressures exert influence on this resource, as outlined above, a range of indicators is required to determine the current state of our water resources. Data gaps are apparent for many of the potential water indicators, and the state level information is generally collated by river system, not LGA. However, this information is reported to further understanding of the current state of water in the region.

In the most recent assessments, only 22% of macroinvertebrate sample sites were considered to be in good condition, compared to 56% of sites reported in SoE 2003.

Figure 18 Water consumption (annual household use)



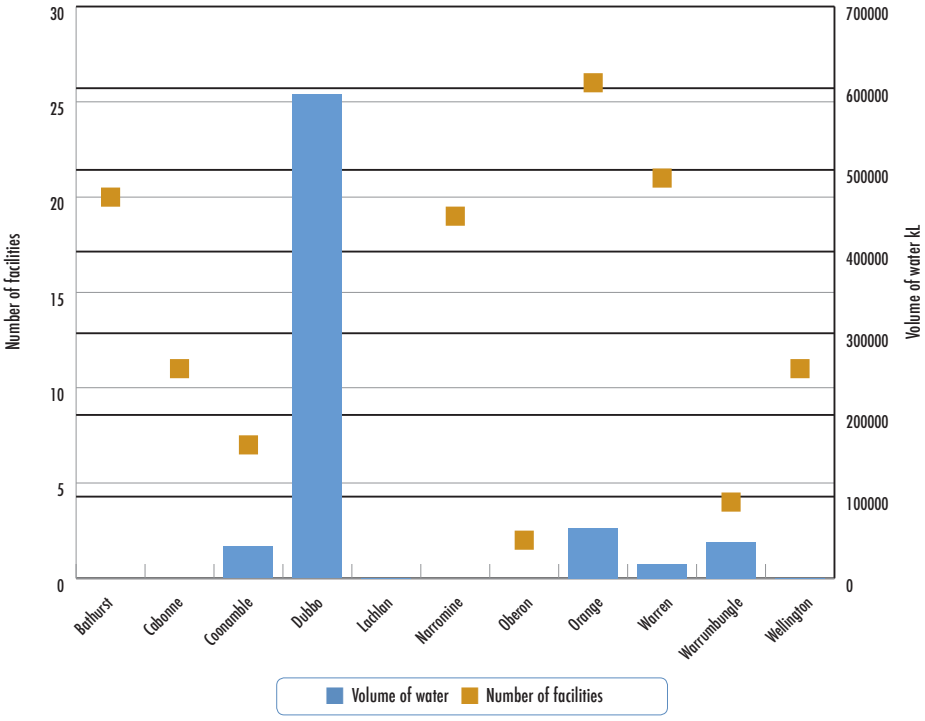
Household water use provides an indicator of the pressure on water resources, particularly in times of declared drought. Average water use across the reporting Councils is 338 kilolitres (kL) per household, as shown in **Figure 18**. Many of the Councils were in declared drought areas for much of the reporting period. The high variability of water use in **Figure 18** may reflect available water resources including rainfall, implementation of water restrictions, and the severity of those water restrictions.

Table 9 Drinking water complaints and instances where drinking water quality below guidelines

Council	Number of complaints and type	Number of times water quality below guidelines
Bathurst	163 dirty water	0
Bourke	No data provided	17
Brewarrina	0	0
Coonamble	30 rusty taste	No data provided
Dubbo	1 dirty water, 1 odour	12
Mid-Western	13 dirty water, 3 odour, 1 poor taste	No data provided
Narromine	1 refund of rates	37
Orange	14 dirty water, 1 poor taste	1
Warren	14	No data provided
Warrumbungle	7	17
Wellington	187 dirty water	3

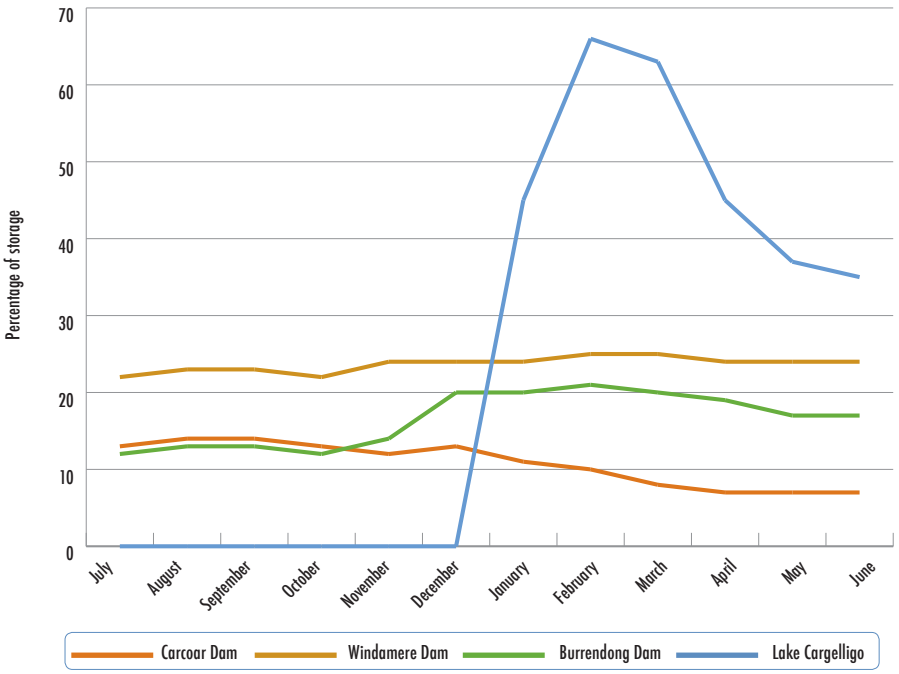
Quality of drinking water is very important to the community, and the number of complaints made regarding water quality may indicate a decline in water quality or increase in awareness and education (**Table 9**). A comparison of complaints against the number of instances that the water quality was below the drinking water quality guidelines indicates that there is no direct link between quality and number of complaints, although data gaps exist in this indicator. Generally the table indicates that drinking water is of a reasonably high standard across the reporting area.

Figure 19 Water consumption (number of irrigated Council parks, sport grounds and annual amount of water used)



As a potentially significant use of water, Council irrigation of sports grounds, parks and other public spaces and the number of irrigated facilities may provide an indication of high water demand. It is noted that the water use shown in **Figure 19** includes treated, untreated, bore and raw water sources and therefore the impacts on water resource may not be directly compared to household (treated) water use. Generally the amount of water used by Councils is not metered and therefore is a data gap. Where data is supplied, the use of water is not significant, excepting for the Dubbo LGA which has large areas and a high number of facilities which are irrigated and consequently high water use. However, Dubbo City Council notes that the irrigated water is comprised of treated water (398,909kL) and untreated water (bores, 175,390kL and river, 18,070kL).

Figure 20 Dam levels for main storages in the reporting area for 2007/2008



Individual storage reports from NSW Government, 2008

Dam storage levels indicate both the current rainfall, as shown by the flood surge seen in December for Lake Cargelligo, and the pressures that water consumption place on water storages. Generally, a steady decline in the percentage of the storage will occur as water is released for consumption (domestic, environmental, industrial and agricultural) and will increase when significant rainfall is received in the catchment.

Each of the storages listed above have varied capacity, from the smaller Carcoar Dam (36,130ML) through Windamere Dam (368,000ML) to the large Burrendong Dam (1,188,000ML). While there are a number of other storages in the region there are data gaps at the State level for these storages.

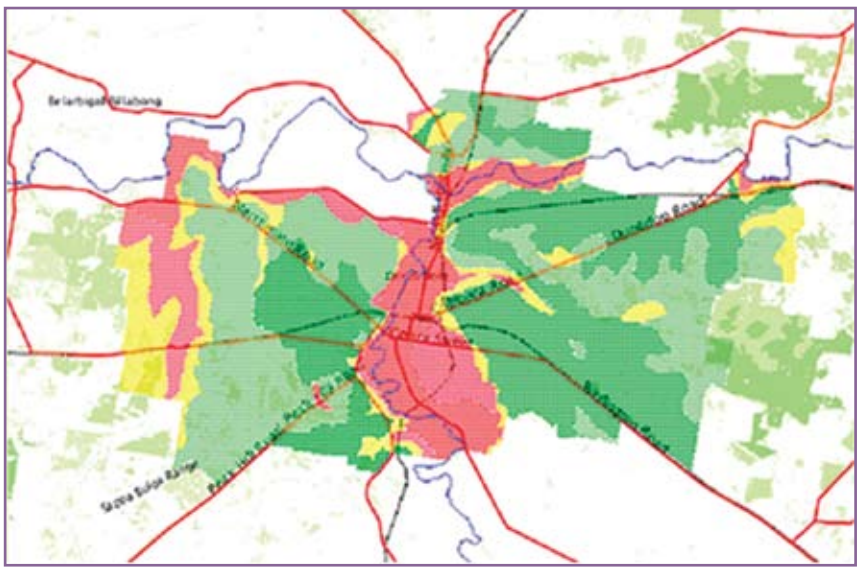
Table 10 River salinity levels

Stream and measuring point	Daily river salinity levels (EC units) for specified period			
	Period of record	2000–03 mean	2003–06 mean	Maximum
Lachlan at Forbes	1999–2006	472	552	1170
Bogan at Gongolgon	2000–06	534	425	982
Macquarie at Carinda	1999–2006	559	651	1207
Macquarie at Baroona	1999–2006	476	499	989
Castlereagh at Gungalman Bridge	2001–06	985	531	1555

NSW State of the Environment Report, 2006

The quality of water depends not only on the volume available but also the levels of salinity, gross pollutants and nutrients. As discussed in 5.1 and Land (Chapter 2), salinity can have significant impacts on water quality affecting crops, stock water and domestic use. It is noted that on average the daily salinity levels are below drinking water limits, however the maximum readings do exceed the 800EC recommended. This has implications for both aquatic habitats and also human health.

Figure 21 Groundwater vulnerability mapping for the Dubbo area



NSW Natural Resources Atlas: Groundwater Vulnerability Mapping for Dubbo, 2008

Groundwater data is generally collated on a broad scale and not based in local government areas. While some limited groundwater vulnerability mapping (NSW Natural Resources Atlas) is available for the Dubbo area; most of this data is currently limited to the coastal areas of NSW. **Figure 21** indicates a high vulnerability (red) in the centre of Dubbo, with low to moderate vulnerability (green) in the surrounding areas. Groundwater vulnerability is 'an assessment of an area's groundwater vulnerability relative to other areas within the study. They include details of geology, depth of groundwater and aquifer details and soils (where available)' (NSW Government, 2008b). Vulnerability relates to the extraction, pollution and other impacts on a groundwater resource. Mapping for further areas within the reporting area may be sought in future Regional SoEs as a useful indicator of potential groundwater risks.

5.3 What is our response?

Surface and Groundwater Use

A large part of water management is under State regulation, particularly the use of groundwater and river extraction licences. The Department of Water and Energy regulates licences for farm dams, bores and other extractions. For example, in the reporting area, direct water harvesting of rainfall by farm dams has been restricted to 10% of the runoff from a property before a water licence is required. This places limits on the ability of farm storages to trap runoff entering rivers, which may allow environmental flows to be maintained. There is also currently a hold on new stock and domestic bore licences for residents on town water, or on properties less than 12ha, due to the ongoing drought and lack of knowledge about groundwater systems.

The Councils and County Councils managing water currently have a strong role to play in education through the use of water restrictions and additional programs such as Orange City Council's recent Water Challenge, which saw both regular promotion of the daily per person usage of water in the city, and a competition between 10 families to reduce water use.

Many of the Councils are currently preparing Integrated Water Cycle Management Plans, which address a range of water policy issues such as stormwater management, recycling and reuse of water, demand management and water restrictions in a more holistic way than has occurred in the past. Through working groups, some Councils are sharing ideas and knowledge to increase understanding and cooperative projects across the LGAs. For example, the Bathurst-Orange-Dubbo alliance of Councils is working on common water restriction definitions. These projects are also seeking to address the impacts of climate change such as reduced water availability and more extreme storm flows.

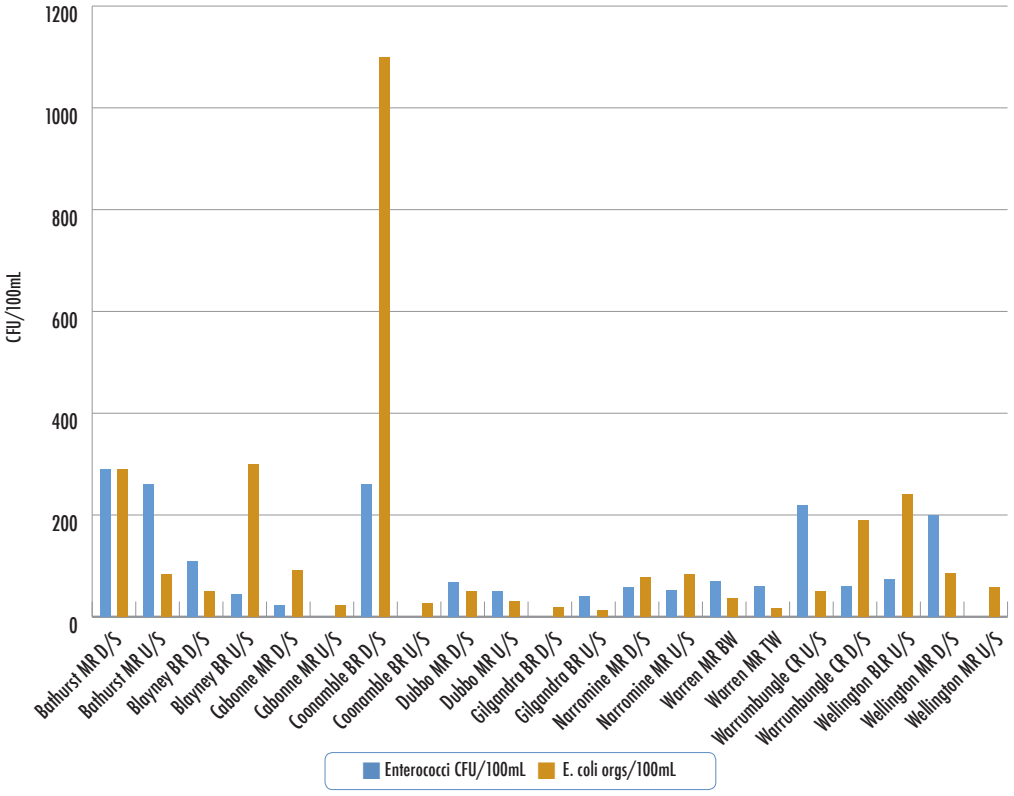
The Councils and County Councils managing water currently have a strong role to play in education through the use of water restrictions and additional programs.

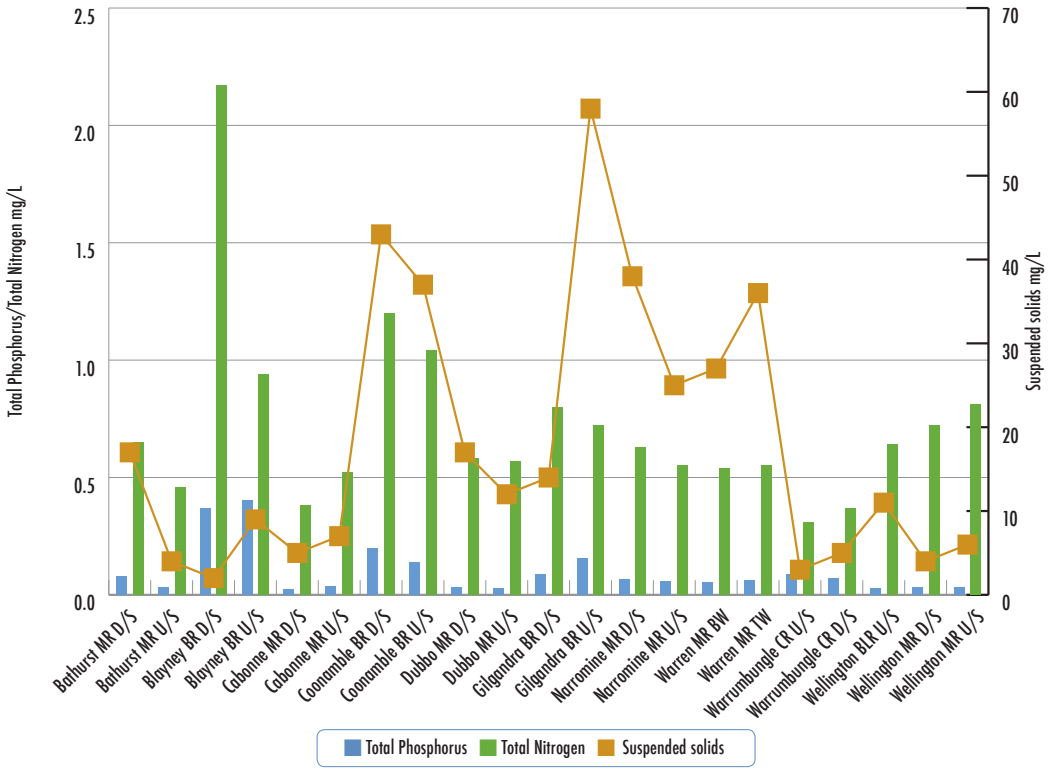
Water Quality

Changes to State legislation commenced in 2004 and have culminated in a suite of new river regulations such as Water Sharing Plans. These plans include environmental flows to help maintain riparian health even when flows are low due to extraction and drought.

The Central West CMA has also funded a water quality monitoring program across the Councils. Data is collected by Council officers on a regular basis and provided to the CMA, which collates the data. Examples of two indices are shown in **Figure 22** for phosphorus and faecal coliforms. This is also utilised by the Salinity and Water Quality Alliance, a working group of Councils across the catchment sharing knowledge, ideas and engaging in cooperative projects. This Alliance is supported by the Central West CMA, and is outlined in a case study in this chapter.

Figures 22 a & 22b Examples of water quality data from the reporting Councils





Legend

MR	Macquarie River
BR	Belubula River
CR	Castlereagh River
BLR	Bell River
D/S	Downstream (of the town)
U/S	Upstream (of the town)
BW	Bottom Weir
TW	Top Weir

Table 11 Council effluent reuse

Council	Percent of effluent reused	Location
Bathurst	24	Macquarie River
Blayney	100	Cadia Mine
Brewarrina	1	No data provided
Coonamble	47	No data provided
Dubbo	98	Fletchers, Greengrove, Polldale
Lachlan	30	No data provided
Mid-Western	Gulgong STP 100	No data provided
Orange	93 (3276.06ML)	Cadia Mine
Warren	5	No data provided

Reuse of effluent not only reduces the impact of effluent (nutrients and oxygen) on receiving waters, but also reduces the demand for potable water and therefore dam storages. Those Councils that have the ability to reuse effluent are able to divert significant quantities (up to 100%) provided that industries are available to utilise the water, such as Cadia Mine situated near Orange; this is shown in **Table 11.**

Councils also have responsibility under the *PoEO Act 1997* to monitor those premises that are licensed to discharge to waterways, as with air emissions. The numbers of premises licensed under the *PoEO Act 1997* are described in Atmosphere, Chapter 3.

Table 12 Volume of litter in street sweeper collections and gross pollutant traps

Council	Catchment area of gross pollutant traps	Volume collected in traps	Volume collected in street sweepers
Bathurst	839ha	200 tonne/year	3650 tonne/year
Blayney	253ha	0.5m² each wet	780 tonne/year
Bourke	No data provided		
Brewarrina	No data provided	0.15 tonne/wet	684 tonne/year
Cabonne	No data provided		
Coonamble	No data provided		400m³/year
Dubbo	642ha	45.45 tonne/year	1321.7 tonne/year
Gilgandra	No data provided		
Lachlan	No data provided		
Mid-Western	100ha	6 tonne/year	529 tonne/year
Narromine	No data provided	No data provided	390m³/year
Oberon	No data provided	No data provided	250m³/year
Orange	92.1ha	No data provided	No data provided
Warren	250ha	1*	163.5m³/year
Warrumbungle	No data provided	4 cubic metres	284.5m³
Weddin	No data provided		
Wellington	5ha	6 tonne/year	846m3/year

*Unit of measurement not provided

Litter collections in both gross pollutant traps and street sweepers provide an indication of potential water quality impacts as shown in **Table 12**. As the units of measurement are different across the Councils, no direct comparison can be made. However, the volume of street sweeper litter does indicate that litter has the potential to cause a significant impact on local waterways. Installation of gross pollutant traps and street sweeping are both responses by Councils to litter impacts, and while there are ongoing costs associated with maintenance and cleaning of these traps and operation of the street sweeping fleet, there are significant benefits to aquatic ecosystems and the visual improvement of waterways plays a significant role in community awareness of Council environmental programs.

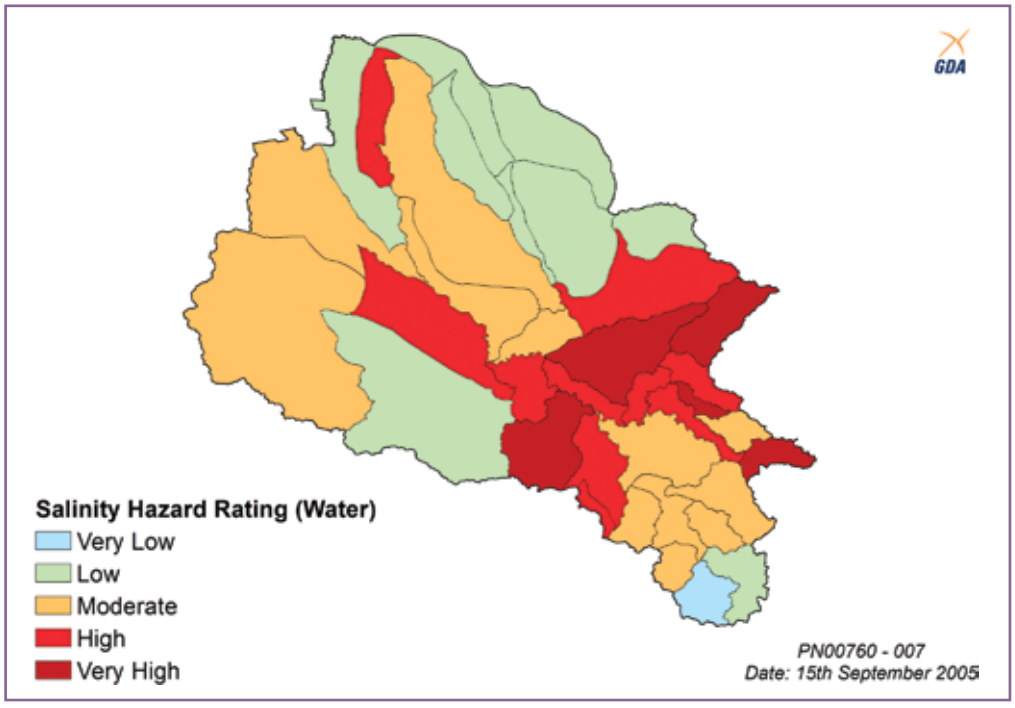
Salinity

It is acknowledged that the first response required to manage salinity impacts is data. Mapping projects have been undertaken by a range of State agencies; however there is no single source of this information across large regions such as this reporting area. The map provided has been collated from some of these sources by the Central West CMA as part of the catchment planning process (**Figure 23**). Ongoing monitoring of high risk areas is also required and undertaken by a number of Councils. The Dubbo City Council program is outlined in a case study in Land (Chapter 2).

Activities undertaken to reduce the impacts of land clearing may also reduce salinity, by revegetating potential recharge areas in the landscape and improving ground cover in discharge areas. A number of Central West CMA programs target salinity management for both landscape and water quality outcomes. These are further outlined in Land (Chapter 2).

Ongoing monitoring programs by State agencies also allow for increased knowledge and understanding of salinity processes. The Sustainable Rivers Audit (MDBC, 2007) measures river health by macroinvertebrate and fish monitoring as well as some hydrology and vegetation indicators. In combination with water quality data, the impacts of salinity on freshwater habitats can be determined. This data is not available for this report.

Figure 23 Salinity hazard mapping (water) for the Central West



Central West CMA 2008)

CASE STUDY

Strategic Partnership

Central West CMA and the Salinity & Water Quality Alliance

The Central West Councils and the Central West CMA have developed a partnership through the Local Government Forum to promote improved natural resource outcomes across the catchment. Through this Forum, all parties sought to institute a more efficient scheme for Central West CMA incentives to be delivered to the Councils, for the implementation of natural resource projects.

Previous incentives for Local Government had been rolled out at times that did not suit the Councils' budgeting framework, making it difficult to deliver matching funds, or in the case of smaller Councils, to take advantage of the incentives.

The Central West CMA therefore determined to increase the amount of funding available to the Councils, in a timeframe that better suited their budget structure, if the Councils could demonstrate that the projects were developed on a collaborative basis that delivered more strategic outcomes in terms of spread across the catchment and support of the Catchment Action Plan targets.

The Councils agreed to this model, seeing it as an opportunity to revitalise an existing Alliance - the Salinity and Water Quality Alliance - that could develop and guide the projects. A joint Expression of Interest was developed, with eleven of the Councils nominating projects that would improve the water quality of the catchment. This was to be achieved either through riparian restoration works, constructed wetlands or water sensitive urban design projects.

Top: Promotional poster
Bottom: Salinity & Water Quality Alliance

As a result of this decision the Central West CMA invested $1 million towards ten projects, while an eleventh project with Bogan Shire was funded from another Central West CMA Incentive Program. The ten Councils undertaking projects were: Bathurst, Cabonne, Coonamble, Dubbo, Gilgandra, Narromine, Orange, Warren, Warrumbungle and Wellington. The Councils added significantly to the investment by the Central West CMA by adding a further $823,000 (in cash and in kind) towards the projects.

As most of these were major projects, it was determined to seek a consultancy to scope out and, where necessary, design the projects to ensure that they were all undertaken using best management practice. Workshops were run in support of the projects to provide staff with any additional skills and information that would be required for the successful completion of the projects, while Dubbo City Council's Manager of Landcare Services provided on-ground support to the other participating Councils. This led to a strengthening of the ties between the Councils and the Central West CMA, resulting in successful on-ground outcomes, while, at the same time, building the capacity of the Councils and their communities to undertake natural resource management initiatives in the future, and, significantly, allowing smaller Councils - that may not otherwise have participated - to undertake projects.

HUMAN SETTLEMENT

6

This chapter reports on human settlement effects including development, noise and waste. Improving, maintaining and balancing the diverse social, economic and environmental characteristics of the region are crucial in attaining a good quality of life for the community as a whole. Generally, local Councils have this responsibility, with some regulation and guidance from the State and Federal governments. Local Councils are responsible for urban planning, infrastructure, some aspects of environmental restoration and protection and conservation of resources, provision of community facilities, and community services. This wide range of responsibilities requires sound information on which to make decisions.

Ecologically sustainable development principles are essential in managing and improving services and facilities and should include attributes such as protection of the environment, culture, community involvement, facility access, employment opportunities and human health and safety. Community involvement on projects, including the opportunity for volunteering, creates and improves the sense of community for the area and is a key principle of sustainability. This is further addressed in Chapter 8, Sustainability, with examples of community involvement projects.

6.1 What are the pressures from human settlement?

Waste

Waste is caused by the disposal of products at the perceived end of life of the product or simply when the user has no further need for the product.

Solid Waste

Solid waste generated within the reporting area originates from the following sources:

- **Domestic:** comprises general household waste and garden organics (including waste from the Councils' kerbside collections and waste taken directly to landfills by residents).
- **Municipal:** includes waste from Council construction and maintenance activities (roadwork, maintenance of parks and reserves etc) and street and park litter bins.
- **Building and demolition waste.**
- **General commercial and industrial:** mostly from agriculture, small businesses, restaurants, shopping centres, land clearing or green waste etc.

This waste requires transport, recycling and disposal which uses significant energy, as well as creating potential pollutants in the form of air and water pollution and greenhouse gas emissions such as methane. Noise pollution may also occur at some landfills or from the transport of waste.

Hazardous Chemicals

Hazardous chemicals include common household and agricultural materials such as pesticides, herbicides, paints, cleaning products, oils, car batteries and pharmaceuticals. Chemicals have the potential to cause significant local or regional impacts on both human health and the environment. Irresponsible disposal of such chemicals can cause acute and devastating impacts upon the natural environment, particularly contamination of aquatic systems, land and ingestion by animals. Some Councils hold Household Hazardous Chemical Collections for residents. The regional waste collaboration, NetWaste, also organises and promotes DrumMuster collections for agricultural chemical containers several times a year across the catchment.

Sewerage Treatment Plant Sludge

The Councils treat raw sewerage at a number of sewerage treatment plants (STPs) across the reporting area. The liquid and solids are separated during the treatment process. After processing, the treated liquid (effluent) is released into receiving

waters or is recycled. The treated solids (biosolids) are transported from most STPs for beneficial use, or disposed of. Biosolids can be used as soil conditioners and fertilisers in areas such as agriculture, forestry, composting and land rehabilitation. Effluent discharged to rivers can also change the nutrient composition and oxygen levels of receiving waters, affecting biodiversity and potentially changing aquatic habitat and therefore this process needs to be monitored and controlled to minimise impacts.

Liquid Waste
There are currently a significant number of domestic and commercial premises throughout the reporting area that rely on a septic tank arrangement for their effluent disposal. These premises are located where, due to the unavailability of sewer mains, or for other site-specific reasons, a normal sewerage service cannot be provided. These often occur in small villages, remote communities and on farms. Trade wastes are those liquid wastes produced by industry which are discharged to sewer and may contain a range of pollutants that require treatment prior to discharge. This action is licensed under the *PoEO Act 1997* and Councils have a role in monitoring and compliance of these discharges.

Waste Management Facilities
The various sources and types of waste mentioned above are the reason Councils require landfills and waste management facilities. Treating waste and burying waste in landfill has the potential to impact on native vegetation and other aspects of the environment. Waste management facilities can result in environmental impacts such as noise, odours, windblown litter, methane gas emissions, groundwater contamination, and erosion, sedimentation and weed infestation of adjacent waterways. Closed landfill sites can pose similar environmental risks and land instability. There are both operating landfills and closed landfills across the reporting Councils.

Noise

Noise pollution encompasses both sound and vibration and is defined in the *PoEO Act 1997* as:

'The emission of offensive noise, which means noise that by reason of its level, nature, character or quality, or the time at which it is made, or by any other circumstances, is harmful (or likely to be harmful) to or interferes unreasonably (or is likely to interfere unreasonably) with the comfort or repose of a person outside the premises from which the noise is emitted.'

PoEO Act 1997

Noise is a type of pollution that has direct physiological and psychological effects on people. Noise can have a range of impacts from minor annoyance to more serious damage to hearing. Some researchers now believe that deafness in elderly people is not just a process of ageing and that it can be largely attributed to long-term exposure of the ears by loud noise.

When this occurs, irreversible physiological changes to the hearing mechanism of the ear can result. In less severe cases noise can lead to anxiety, sleeplessness, emotional stress and neighbourhood disputes. Noise can cause impacts on sensitive land uses including residential areas, schools, hospitals and parks.

Noise also affects the habitat of some native fauna species. This may include impacts on breeding cycles and a reduction in the number of species in a locality (moving to avoid noise). Some types of fauna are more susceptible to noise and vibration than others. For example reptiles that rely on vibration as a primary sense will avoid areas of particular noise wave patterns or vibrations as they disrupt the ability to hunt and avoid predation.

Noise Complaints
Intermittent and intrusive noises include the 'screeching' of brakes, the use of engine brakes on heavy vehicles, agricultural machinery, industrial noise and acceleration noise at traffic lights. Rail movements also provide intermittent noise, with many villages and towns located on the rail lines. Noise from barking dogs in residential areas is a concern to the community and is the most common type of noise complaint to Councils. Domestic air conditioners and music, which are not always on and therefore intermittent, are another source of noise that may have a psychological impact on the residents of an area.

Complaints concerning the noise from machinery on commercial and

industrial premises are occasionally made to Council or the DECC Environment Reporting Line. Complaints are more frequent in cases where commercial operations are situated close to residences such as small neighbourhood shopping centres using external refrigeration equipment, or where agricultural activity takes place close to residential houses. Some industries may also have the capacity to operate on a much larger scale and therefore may have long reaching impacts. Noise from agricultural activities and heavy industries such as mining also has the potential to cause significant impacts across a broader landscape.

Land Use Planning

Land use and the need for appropriate planning of settlement patterns are further discussed in Land, Chapter 2.

Development Pressures

Key areas where impacts occur include residential, mining/heavy industry and rural/residential developments. In the Central West, a particular pressure is that of the rural small holding, where existing agricultural land is sub-divided to meet demand for five or ten acre residential lots in an otherwise rural landscape. This requires provision of services such as waste collection and infrastructure such as water (tank or town), sewer/septic and roads while reducing the available areas of primary production and therefore increasing pressure on agricultural land. The interface between these areas may also cause noise and other complaints such as odour and air pollution.

CASE STUDY

Narromine Shire Council

Large grain handling facility and residential dwelling

In August 1998, Council consented to the sub-division of land on the south western outskirts of Narromine for the expansion of an existing grain handling facility. Soon after, Council consented to the construction of a residential dwelling replacing an existing dwelling on land neighbouring the grain handling development.

Both land uses were permissible under the LEP with Council's consent. The grain handling development is one of three such developments of similar characteristics which were all sited in a cluster in an area described as sub-urban but zoned rural. The cluster development is hereafter referred to as the grain handling precinct (GHP), however, the GHP was not specifically recognised as a precinct under any environmental planning instrument.

Four years after the dwelling was constructed, the owners of the dwelling complained to Council about noise from the neighbouring grain handling facility impacting on their amenity, particularly during the early hours of the morning. The original complaint was in relation to noise coming from grain aeration units fixed to approximately 14 x 800 tonne silos which operated on automatic sensing devices activating the aeration units when certain weather variations occurred (temperature and humidity). However, this escalated to include all noise associated with the development over the ensuing three years due to the further expansion of the grain handling facility.

Council found itself in a position where on one hand, it had a large rural industry wanting to expand its business which injected considerable social and economic benefits into the Shire, and on the other hand, the owner of the neighbouring dwelling seeking a quiet rural lifestyle.

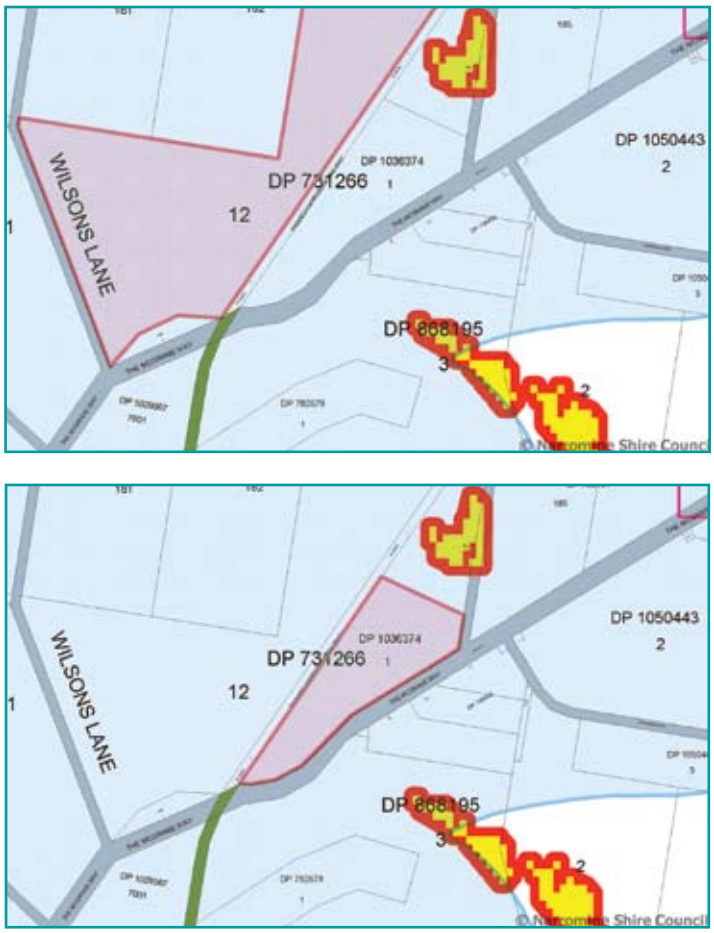
This land use conflict (which is still ongoing) could have been avoided through recognising the potential for conflict prior to consenting to any of the developments in the GHP and the neighbouring rural area (i.e. the dwelling).

This could have been achieved through, but not limited to:

- Establishment of suitable zones;
- Setting appropriate conditions including sufficient buffer zones; and
- Council giving consideration to all existing development in the area when applying Section 79C of the EPAA to the assessment of the previous applications allowing the developments to co-exist.

In addition to the noise issue with the existing operations, the developer also sought to expand its business with subsequent development applications being submitted to Council. The resulting assessment process involved careful consideration of all issues subject to the development and impacts on neighbouring amenity. Council relied heavily on the Industrial Noise Policy and undertook a noise impact assessment using noise specialists in this field.

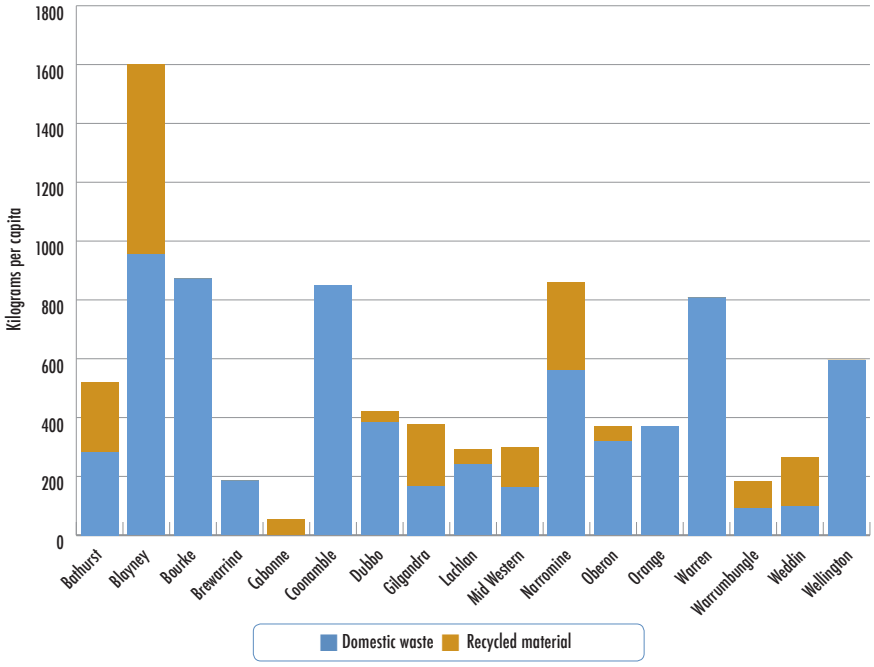
The effects of not identifying potential land use conflicts results in lengthy and costly situations which could otherwise be avoided with the application of sound planning principles.



Top: Aerial layout of the facility
Bottom: Grain handling facility

6.2 What is the state of human settlement?

Figure 24 Domestic waste and recycling per capita



Domestic waste per capita is an indicator of consumption patterns across the reporting area, as well as signifying the potential impacts of landfill, recycling and transport of waste. Over time, the trends in domestic waste are a useful guide to Councils for education programs aimed at avoiding, reducing, reusing and recycling domestic waste rather than disposal. There is a high variability across the reporting area, and at present no pattern of influencing factors is obvious, such as the size of the Council or level of services available in that LGA.

Figure 25 Domestic waste charges per annum

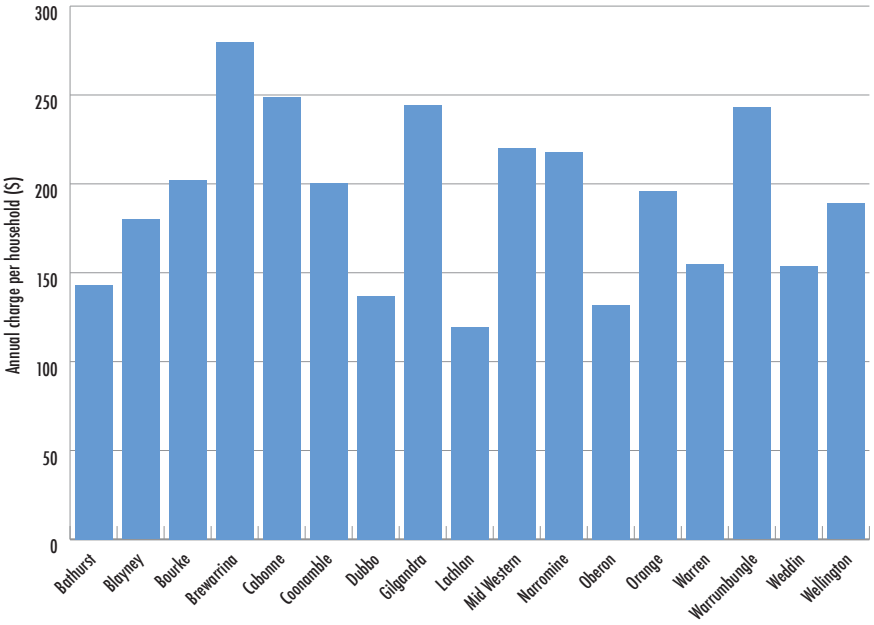


Figure 25 indicates that the domestic waste charges are not significantly different across the reporting Councils, with an average charge of $188 and a range of $119 - $280. However, this figure does not reflect the level of services provided for this charge, including frequency of waste collection and recycling facilities. The recycling services provided for each Council are indicated in **Table 16**.

Table 13 Total waste collected at landfills and transfer stations

Council	Waste at primary landfill (tonnes per annum unless stated)	Waste at rural landfills and transfer stations (tonnes per annum unless stated)
Bathurst	43,757	136
Blayney	11,000	160
Bourke	2,899	80
Brewarrina	2,500	1,000
Cabonne	No data provided	3,049
Coonamble	3,000	500
Dubbo	48,346	667
Gilgandra*	1,000m3	200m3
Lachlan	3,200m3	2,608m3
Mid-Western	22,176	2,944
Narromine	4,804	1,314
Oberon	1,750	100
Orange	83,608	0
Warren	1,380	70
Warrumbungle	860	800
Weddin	3,300m3	No data provided
Wellington	No data provided	

* Data gap – estimate only

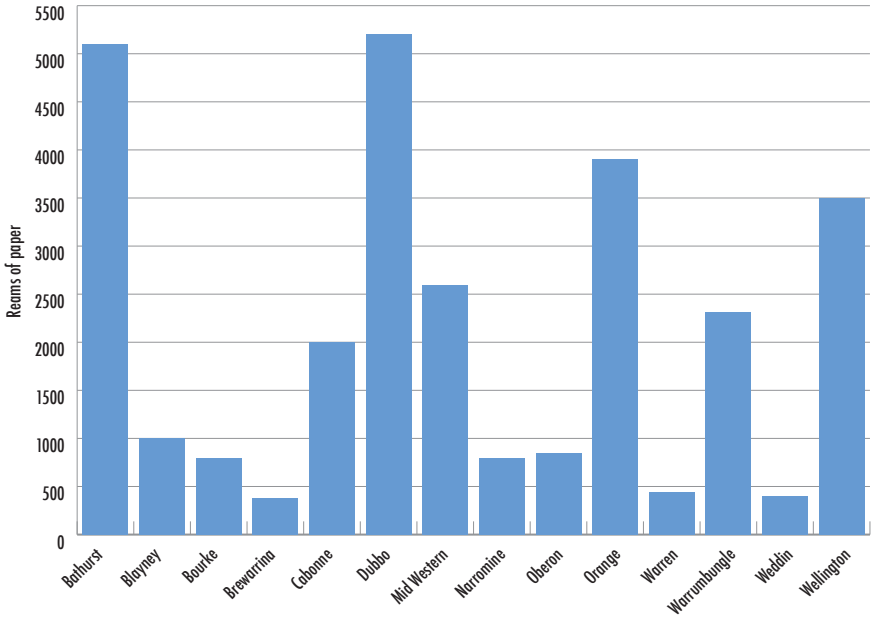
As with domestic waste, total waste indicates consumption patterns and pressure from the environmental impacts of landfill and transport of waste. The quantity of waste at landfills is linked to the population of the LGA, although this is still a variable relationship. Differences in units of measurement make any direct comparison difficult, and it is noted that the quantities recorded for rural landfills are often estimated as many do not have a recording system, particularly in rural areas. No breakdown of the types of waste at these smaller facilities is available, nor is the percentage of recyclable or compostable material that is landfilled.

Table 14 Illegal dumping complaints

Council	Illegal dumping complaints
Bathurst	49
Blayney	1
Bourke	0
Brewarrina	0
Cabonne	3
Dubbo	147
Lachlan	2
Mid-Western	5
Narromine	2
Oberon	0
Orange	89
Warren	0
Warrumbungle	35
Weddin	0
Wellington	1

The number of complaints about rubbish dumping does not reflect the frequency of incidents, nor the impact of illegal dumping. However, it does indicate community awareness of illegal dumping and the potential impact that it may have on the environment. The three Councils with the largest population have significantly higher complaint levels than the smaller Councils. Where recorded, the complaints generally relate to household rubbish, rather than industrial or commercial. Dubbo City Council has undertaken a community awareness program in the local newspaper about illegal dumping and this may have caused the increase in complaints.

Figure 26 Office paper used by all Councils in the reporting area



The reporting Councils order an annual 26,969 reams of paper. The number of reams used varies significantly across the Councils, with higher numbers at Bathurst, Dubbo, Oberon and Wellington Councils (**Figure 26**). This may be used as an indicator of waste management practices in Councils, such as printing on both sides of each sheet or utilising electronic records. Data on the recycling of paper is not currently available.

Table 15 Noise complaints to Council

Council	Number of complaints and cause
Bathurst	2 industrial, 12 motor bikes, 6 tools, 1 entertainment, 13 roosters
Blayney	No data provided
Bourke	1
Brewarrina	0
Cabonne	0
Coonamble	1
Dubbo	59
Gilgandra*	1
Lachlan	4
Mid-Western	9
Narromine	4 barking dog, 1 industrial
Oberon	0
Orange	56
Warren	6 barking dog
Warrumbungle	No data provided
Weddin	8 barking dog
Wellington	1 air conditioner, 2 construction

The number of noise complaints varies significantly across the LGAs. Where recorded, the primary cause for complaint is barking dogs, although the two Councils with the highest number of complaints have not provided a breakdown of complaint sources. It is also noted that the location (rural or urban) of the complaint is not recorded, which may provide useful indicators of development pressures and impacts on land use planning.

The EPA also has responsibilities for noise, limited to larger industrial sites and some coastal activities such as marinas, and notes that 15% of calls (1,438) to the pollution line are related to noise (DECC, 2006). However no breakdown of the source of the complaints is provided.

6.3 What is our response?

Waste

Avoiding the creation of waste is generally seen as the best strategy for dealing with the problems it creates. Key responses to deal with waste include reducing the volume of waste reaching landfills, minimising the environmental impacts of waste facilities, and encouraging the development of new waste treatment and recycling facilities. Bathurst Regional Council has recently introduced kerbside domestic recycling to the city allowing residents to separate recyclables from waste in the home and have these collected from the house, while many Councils such as Mid-Western, Orange and Blayney have had kerbside recycling programs for some years. Most Councils provide recycling collection points in smaller villages and localities to encourage recycling.

Education programs are an integral component of waste reduction and recycling. NetWaste operates several education programs across the Councils and employs an Environmental Learning Advisor to design and implement programs targeting specific issues. For example, NetWaste is currently promoting an 'e-waste' program to improve collection and recycling of electronic wastes such as computers.

While there have been no large new landfills built over the reporting year, many Councils are improving the technologies at the local landfill to minimise the impacts of those sites. For example, methane gas collection has been implemented at larger landfills servicing the larger cities within the reporting area such as Orange and Bathurst. Recycling technologies are continually improving, and collaborations such as NetWaste are able to assist Councils to utilise these as outlined in the Gilgandra Shire Council Fluorescent Tube Recycling program outlined in a case study in this chapter.

Improving agricultural practice can also assist to reduce chemical waste through improved efficiencies in applying fertilisers, better stock management and improved product design (dips and other chemicals, reducing the quantity required and therefore container waste). Several Central West CMA programs indirectly target this issue, through better promotion of soil management and conservation farming techniques.

Liquid wastes are more difficult to target through education and responses rely on improving treatment of the wastes to allow more use of recycled effluent and biosolids, or mitigated impacts on receiving waters (addressed in Chapter 5, Water).

At State level, the Waste Fund supports the operation and waste reduction programs of Resource NSW; litter reduction and environmental education campaigns, such as Our Environment – It's a Living Thing; implementation of the Government's Waste Reduction and Purchasing Policy (WRAPP); the education program on illegal dumping; and the Government's obligations under the National Packaging Covenant (NPC). A $6-million anti-dumping package was announced in May 2002. Changes to fines included the doubling of on-the-spot fines for illegal dumping for individuals, and more than tripling for corporations. Two public media campaigns (Litter. . .It's in your hands and Don't be a tosser) have also helped develop community awareness of the litter issue and encourage litter reduction and changes in attitudes and behaviour. These activities support the tougher littering laws introduced in 2000 (DECC, 2006).

Community involvement in waste activities includes participation in Clean Up Australia Day. For example, the 2007-2008 Clean Up Day was largely successful with the Councils reporting a range of activities including: Dubbo, 50 tonnes collected; Orange, eight sites with 150 people; Brewarrina, two sites; Lachlan, five sites; Mid-Western, two sites; Bathurst, three tonnes collected.

Some Councils also hold site specific activities, such as Bathurst's Macquarie Cleanup which saw the collection of 1.5 tonnes of litter and waste. These activities not only provide the community with the ability to make an impact on their local environment but also play an important role in educating people about the impacts of litter.

Community involvement in waste activities includes participation in Clean Up Australia Day. ...the 2007-2008 Clean Up Day was largely successful with the Councils reporting a range of activities including: Dubbo, 50 tonnes collected; Orange, eight sites with 150 people; Brewarrina, two sites; Lachlan, five sites; Mid-Western, two sites; Bathurst, three tonnes collected.

Table 16 Recycling collection services available

Council	Services provided
Bathurst	Kerbside recycling, DrumMuster, e-waste, green waste, drop-off at rural transfer stations
Blayney	Recycling drop-off points at Blayney and Neville landfills; kerbside recycling to 2402 households; green waste drop-off points at Blayney and Neville landfills
Bourke	Nil
Brewarrina	Nil
Cabonne	Fortnightly recycling service to 300 households; 10 drop-off points
Coonamble	Fortnightly kerbside recycling service at Gulargambone; greenwaste and various recyclables (steel, paper, plastic, glass) accepted at Gulargambone Transfer Station and Coonamble landfill
Dubbo	Drop-off points at transfer stations and villages
Gilgandra	Kerbside recycling and drop-off point at landfill
Lachlan	Bulk metals, used oil, drum muster, e-waste at landfill
Mid-Western	Kerbside collection in Mudgee and Gulgong; Waste Transfer Station for drop off of 16 products
Narromine	Kerbside recycling
Oberon	Drop-off at landfill or transfer station
Orange	Fortnight kerbside collection of 240L bins; free drop-off of recyclables at MRF including sump oil, green waste, scrap steel, batteries, and re-sale items; annual bulky waste kerbside collection; purchase of additional bulky/greenwaste tickets.
Warren	Kerbside recycling
Warrumbungle	Kerbside recycling and drop-off at landfill
Weddin	3 drop-off points
Wellington	Drop-off (private service)

Councils provide a range of waste collection services to the community. The level of services will depend on demand from, and potential cost to, the community, resources and facilities available, and the presence of cooperative contacts with other Councils, through NetWaste.

NetWaste (further discussed in Sustainability, Chapter 8) has developed regional and sub-regional waste management plans which work towards provision of services across several Councils to ensure continuity and access to resources in more remote areas. Further details of these plans are found at the Netwaste website, www.netwaste.org.au.

The level of services provided in each LGA will assist the community to participate in waste management through the waste hierarchy of 'avoid, reuse, recycle, dispose', however this must be supported by education and regular reminders about those waste services for effective collections to be made. For example, greenwaste or organic collections are often threatened by contamination and it has been found that regular education and information to the community significantly reduces the level of contamination and improves the end product.

Table 17 DrumMuster collection results

Council	DrumMuster
Bathurst	1480
Blayney	1064
Bourke	100
Brewarrina	No data provided
Cabonne	3384
Coonamble	3376
Dubbo	924
Gilgandra	7462
Lachlan	34725
Mid-Western	2440
Narromine	24490
Oberon	1500
Orange	113
Warren	4438
Warrumbungle	8938
Weddin	5315
Wellington	4488

In addition to services for residents such as recycling and bulky waste collections, many Councils, supported by NetWaste, also provide collections for agricultural chemicals and chemical containers, as shown in **Table 17**. As these may have a significant impact on the environment if not disposed of correctly, such services are essential. The success of the collections again depends on promotion and education of the community to ensure that people recognise the need for the service and then participate. A large number of drums were collected across the reporting area. Dubbo City Council also participates in ChemCollect for unwanted chemicals, and reports that 4,500 tonnes of chemicals were collected in June 2008.

Avoiding the creation of waste is generally seen as the best strategy for dealing with the problems it creates.

CASE STUDY

Gilgandra Shire Council

Fluorescent tube recycling

A local resident representing the Pink Disease Support Group alerted Council to the fact that, whilst the Federal Government's plan to replace standard incandescent light bulbs with fluorescent ones to reduce greenhouse emissions has merit, it also presented the dilemma of disposal. Each fluorescent tube contains a level of mercury and Pink Disease sufferers have intolerance to mercury, even in minute levels.

Council implemented a fluorescent light recycling service with the support of local schools, the hospital and electrical contractors. The recycling program extracts the mercury from the tubes and effectively reduces the amount of mercury ending up in landfill. In the past 12 months Council has recycled in excess of 600 four foot tubes which would otherwise have been disposed of to landfill.

Through Netwaste, Council has located an organisation which offers a recycling service of fluorescent tubes. This organisation is SITA Environmental Solutions based in Bathurst. SITA Environmental advises that the fluorescent tubes will be recycled at the Advanced Recycling Australasia facility where the tubes will be processed using a crush and separation technology. Components collected include mercury, aluminum, phosphor powder and glass. The end result is that hazardous, discarded products are transformed into clean, environmentally sound by products.

- Mercury is distilled from the separated powders and then reused in the manufacture of dental amalgams.
- Aluminum from the tube ends is separated and recycled into cast products such as ingots used in foundry applications.
- Phosphor powder is used in the manufacture of fertilizer products for the agriculture industry.
- Glass is separated and recycled into glass wool used for home insulation.

Council promoted the recycling project with the assistance of Pink Disease Support Group, Gilgandra Multi Purpose Service (part of the Greater Western Area Health Service), schools and local electricians. Council continues to fund the recycling project at a cost of $1.50 per globe.

As reported in the Gilgandra Weekly Newspaper in July 2007:

'Manager of Environmental Services, David Neeves, said Council has sourced an organisation which can recycle fluorescent tubes under safe conditions. The end result is that hazardous discarded products which make up the tubes are transformed into clean, environmentally sound by-products.

Mr Neeves said whole tubes can be delivered to the waste depot for recycling but they should not be included in the normal yellow bag collection service. The three Gilgandra schools, Gilgandra IGA and the Gilgandra and Gularambone hospitals have offered to collect their own tubes.'

Noise

The Protection of the Environment Operations (Noise Control) Regulation 2000 restricts the times in which domestic activities can be undertaken in a residential setting such as mowing lawns and using power tools. Local Councils are largely responsible for managing noise issues (in collaboration with the Police) under the *PoEO Act 1997*. Noise abatement issues are generally handled by local Councils, the Police, DECC and/or the specialised authorities such as the Roads and Traffic Authority.

Council rangers and Environmental Health officers regularly respond to noise complaints and have the ability to issue infringement or warning notices under several Acts. Most of the reporting Councils will also use these complaints as an opportunity to educate the community on regulations and appropriate noise levels. For example, many Council rangers will offer advice on ways to assist with barking dog control prior to issuing a fine or notice. Improved planning can have a beneficial long term impact on noise issues, particularly in urban areas. For example, improved building design and the use of buffers such as earth mounds and vegetation corridors are commonly utilised across the region in development conditions to reduce the impact of noise.

The main type of noise complaint in the region originates from transport. It is difficult to reduce effectively noise from roads, however measures can be taken to effectively reduce the impact of transport as well as agricultural or heavy industry noise (such as mining). These measures include landscaped earth mounds, acoustic fences, timing of activities such as blasting, and noise insulation of homes. Land use planning therefore has a significant role in prevention of noise impacts rather than remediation of noise as it occurs.

Land Use Planning

This is further addressed in Land, Chapter 2. However, a specific example of noise relating to land use planning is given by Mid-Western Regional Council. The residents of Cumbo Valley have been so affected by noise from the Wilpinjong coal mine that despite three years of attempts to resolve the issue, many residents are talking of leaving the valley and moving home.

Launch of the Flourescent Tube Recycling Program (Photo: The Gilgandra Weekly)

L to R: Mrs Rebecca Sommerville (St Josephs Primary School), Mr Greg Horton (Acting Principle Gilgandra High School), Ms Jo Peterson (Gilgandra MPS), Mr Phil Maher (Principle Gilgandra Public School), Heather Thiele (Pink Disease Advocate), David Neeves (Manager Environment Services Gilgandra Shire Council).

CASE STUDY

Weddin Shire Council

Grenfell Landfill

The Grenfell landfill site has been operating as an unmanned facility for many years. Council has acquired additional lands to secure the future waste disposal for Grenfell and surrounds and has prepared landfill environment management plans in 2000.

However, as many of the surrounding Councils have improved their practice and moved to manned landfills with fee for use, the Grenfell landfill has become an easy target to drop off waste without incurring charges. Also the various drop off points at the landfill are not being observed with co-mingled building waste, asbestos, and a raft of other materials being abandoned in the building waste area.

Consequently, a plan has been prepared to improve practice at the landfill, encourage and promote recycling, secure the site along its boundaries, delineate areas for storage of product and to identify locations for sheds, buildings and structures so that the site can become manned and better managed. It is envisaged that such action will reduce the liability to Council from unauthorised entry, scavenging, OH&S site issues and public health issues at a sanitary landfill.

The concept plan seeks to:
- protect all the boundaries with pig proof fencing
- provide for a site office and amenities
- define the areas where metal, green waste, building waste and tyres will be stored, stockpiled or buried
- define location of moveable litter fences
- define recycling collection areas
- define domestic waste collection area
- define oil and drum muster locations
- improve fire fighting capacity
- restrict operating hours
- man the site more frequently.

Pig proof fencing with high tensile wires, netting at the base and barbed top wire

How it will work
- Users will arrive at the facility and report to the site attendant for assessment.
- The attendant will direct the user to the relevant recycling or disposal points for any wastes being disposed of.
- Users will be encouraged to place their recycling into the correct bins.
- Green waste (lawn clippings, prunings, and small branches) will be directed to the designated area).
- Scrap steel deposited in the metal storage area, free of charge.
- Builders waste, concrete, timber and bulky items will be charged.
- Tyres will be discouraged and charged at market rates, for further processing.
- Drum muster compound and drum collection for specified days.
- Improved signage including Council fees schedule.
- Limited public access to the tipping face.

Some of the works undertaken include erection of a pig proof fence to deter feral animals from entering the site.

CASE STUDY

Lachlan Shire Council

Green Waste and Kitchen Organics Composting Trial in Condobolin

In August 2008, Lachlan Shire Council will be commencing a three year Green Waste and Kitchen Organic Trial, which will be known as 'City to Soil'. The trial will be undertaken in Condobolin and will aim to build on earlier composting trials which have been done in other areas of NSW.

The program seeks to prove the wider economic viability of the 'City to Soil' collection system and establish composted urban organic waste as a cost effective, high quality agricultural input. The project will result in farmers and Councils working together to pull urban organic waste out of the towns waste stream and put back onto agricultural land, simultaneously reducing organic waste to landfill and increasing organic levels in agricultural soils.

The project will quantify the economic benefits to agriculture of returning quality organic products to soil and will aim to identify models for the development of a permanent 'pull' market for recycled urban organics into agriculture.

Each household in Condobolin will be issued with a six litre Airmax bin and roll of cornstarch bags which will be used to collect kitchen organics such as food scraps. A dedicated 240 litre wheelie bin for garden organics will also be issued. The organics wheelie bin will be collected on a fortnightly basis, and the program will also be offered to interested businesses.

The project is funded by the Department of Environment and Climate Change and will be done in partnership with Goulburn-Mulwaree, Queanbeyan and Palerang Shire Councils.

Images courtesy of NSW Environmental Trust, Groundswell, Goulburn Mulwaree Council.

CULTURAL HERITAGE

7

Cultural heritage incorporates both Aboriginal and European heritage. Heritage is defined as:

'Places, objects, customs and cultures that have aesthetic, natural, historic or social significance or other special values for present and future generations'

NSW Department of Heritage, 2008

Remnants of Aboriginal heritage sites including occupational, ceremonial and midden sites can be found on public and private land where disturbances and development has been limited. Non-Aboriginal heritage refers to use of the land since European settlement. Heritage sites include old commercial/ industrial, iconic architecture and military heritage still present in the Central West region.

Types of heritage include:

- Aboriginal heritage – places, landscapes, items, stories, memories and elders
- natural heritage – ecosystems, landscapes, landmarks, water features, parks, gardens and trees
- built heritage – buildings, towns, civil infrastructure, factories and mines
- movable heritage – objects that people collect of artistic, technological or natural origin
- documentary heritage – books, maps, photographs, images
- local histories – spoken, written, visual
- the Arts
- intangible heritage – beliefs, celebrations, customs and usages.

Aboriginal Heritage

The Aboriginal heritage of the region includes pre-European cultural sites such as campsites, stone tool workshops, grinding grooves, travel routes, art sites, ceremonial areas, scarred and marked trees, and artefact scatters. In addition, Aboriginal people place cultural and religious importance on landscape features such as rivers, rocky outcrops, hills and valleys, as well as areas important for their natural values such as the existence of particular plants or animals used for food, medicine or production. The Aboriginal cultural values of the region include post- European sites such as areas, houses and institutions which have contemporary cultural significance to Aboriginal people.

The Central West region is the country of the Wiradjuri and many other groups including Wongaibon, Wailwan and Barundji, who continue to affirm their kinship with this land. The Aboriginal cultural heritage of the region is the living heritage of the local Aboriginal communities, who see its conservation, protection and management as vital to their ongoing cultural ties with their region.

European Heritage

European heritage listings identify areas, landscapes, places, sites, buildings, works and relics that give us a sense of the past and patterns of change through time. The State Heritage Register assesses significance based on seven criteria relating to context, association, aesthetic value, rarity and importance. These values are not mutually exclusive and often are a combination of several values (Heritage Branch, 1996).

CASE STUDY

Warrumbungle Shire Council

Burra Bee Dee Cemetery

Burra Bee Dee Aboriginal Mission operated from the early 1890s until the mid 1950s. The mission developed on a landholding established by Mary Jane Cain for herself and her family. It became a refuge for Aboriginal people from all over the region as an important cultural place for local Aboriginal people. The former mission cemetery is a designated Aboriginal burial place and continues in active use. The cemetery is owned by the Coonabarabran Local Aboriginal Land Council and is managed by the Burra Bee Dee Aboriginal Elders Group.

The former mission site has been listed on the NSW State Heritage Register. The cemetery has been assessed as having local heritage significance for the following reasons:

'Burra Bee Dee and Forky Mountain has a strong and special association for the Gamilaraay people for its social, cultural and spiritual values. Forky Mountain was a special place for being 'born under the mountain' and being buried at the 'foot of the mountain. Burra Bee Dee Cemetery shows evidence of the activity that was undertaken by the local Aboriginal people. The cemetery continues in use by the local Gamilaraay people. It is an important part of the story of the Gamilaraay people and has direct associations with Gamilaraay community leaders such as Mary Jane Cain and Queenie Robinson who are buried in the cemetery. The cemetery reflects changes in monument design and also reflects the creativity of early Burra Bee Dee residents, including Sam Smith who created grave markers and headstones from local materials. The cemetery has a high level of local historical, historical association, social and technical/research significance. It also has a moderate level of aesthetic significance and a high level of representativeness and integrity.'

The Heritage Branch (Department of Planning) recently provided funding for the development of a Conservation Management Strategy for Burra Bee Dee and its cemetery, and for interpretation of the site. In addition, funding was provided by the NSW Environmental Trust for improvements at Burra Bee Dee.

Under these programs a management strategy has been developed for the site and cemetery, with guidance being provided for cemetery management. Interpretative signage of the mission site and cemetery has also been installed. Warrumbungle Shire Council provided support for this project by assisting the expansion of the cemetery, erection of new shelter sheds and identification of legislative requirements for management of the cemetery.

From top: Burra Bee Dee Aboriginal Mission, Burra Bee Dee Cemetery and early graves, interpretive signage

Why is heritage important?

Sense of place and identity in the Central West are directly related to its distinctive natural and cultural heritage. Heritage provides an opportunity to reflect on the history and culture that are unique to a geographical region or object. Heritage places a value on those things and places that are regarded as being special to people that live or have lived in that region, bringing together a community cohesiveness and identity. Heritage provides a link to the work and way of life of earlier generations, helps us to understand who we are today and shapes what we will hand on to future generations.

7.1 What are the pressures on heritage?

Development

This includes physical and aesthetic impacts from road works and road realignment, land clearing, unsympathetic alterations and additions and adjacent development. Further impacts may occur from increased demand for tourism and recreation, particularly affecting natural area heritage; impacts may also occur on built heritage from the increase in smoke and vehicle emissions.

Changes to land ownership can also affect heritage, as new landowners may not recognise heritage significance, and may also change land use affecting heritage. For example, clearing of land for cropping will impact on sites of significance or change the local character of a place.

Lack of Knowledge, Appreciation and Recognition

We have lost knowledge about a significant amount of our heritage, and this may cause a lack of appreciation and recognition of the importance of heritage items and places. There is often a reluctance to acknowledge potential heritage sites as it is felt this may impact on future land use.

Fire, Natural Weathering and Salinity

This causes physical impacts on heritage places and items and may cause permanent loss or damage.

Vandalism and Destruction of Sites

Destruction of sites can occur both wilfully and through ignorance of the location or significance of the site or item.

Restrictions

Restrictions on Aboriginal people to practise their rituals and ceremonies have a significant impact on Aboriginal heritage. This may include loss of access to significant sites or places or lack of ability to carry out ceremonies and cultural activities.

Inadequate Resources

Communities and Councils face a limit in the resources available to protect identify and maintain heritage. This may include inability to respond to threats to heritage items or to conduct heritage assessments. It can also cause neglect, whether known or unknown.

Many of these pressures are difficult to quantify in a general sense across the region, as they may affect some heritage sites more than others. Heritage indicators have been selected to measure and gauge both Aboriginal and Non-Aboriginal heritage in the Central West region and within individual Council areas.

7.2 What is the state of our heritage?

The *Heritage Amendment Act 2001* established the State Heritage Register, which will eventually become a comprehensive list of heritage items of State significance. This recognises the substantial role played by local government in listing and managing items of local heritage significance and sets out a stronger role for the community in identifying and listing items.

State Heritage Inventory and Register

The State Heritage Inventory comprises all items and places listed on NSW statutory registers, including the State Heritage Register and heritage schedules to local environmental plans (LEPs). As at 2003, a total of 37,491 statutory heritage items across NSW were recorded on the Inventory. Over 80% of these items are privately owned; more than 70% are of local heritage significance and listed by local Councils. While Aboriginal sites and relics are primarily cared for under the *National Parks and Wildlife Act 1974,* Aboriginal sites or places of significance can be listed on the State Heritage Register.

Aboriginal Heritage Information Management System

Until recently, Aboriginal objects ('sites') were narrowly defined. However there is an increasing move to record locations that are important to Aboriginal people, recognising linkages to the post-European settlement period and the importance of contemporary places to them. As at June 2003, DECC had registered 39,298 Aboriginal sites and 52,221 features at a total of 41 Aboriginal places across NSW. Many 'intangible' sites and places which have high sensitivity and significance to Aboriginal communities may not be recorded with government. (DECC, 2006).

7.3 What is our response?

Development

Our key responses include the listing of places and items with heritage values, legislative and planning controls to protect them, and partnership programs to support the involvement of Aboriginal and other communities in heritage conservation and management. In order to list sites, heritage studies need to be conducted to determine the location, significance and value of the site or item.

Many of the Councils in the reporting area have heritage officers appointed to coordinate studies and listing of sites, as well as providing advice on individual development impacts. These officers also identify key areas that require protection and seek funding for rehabilitation projects to improve long term management of the place.

Councils also have the authority to implement development control plans which apply to areas or sites and provide an additional level of protection for those areas. These are often applied to heritage towns and villages. For example, Blayney Shire Council implemented a development control plan for the historic village of Millthorpe. This DCP requires new buildings to reflect the look and character of the village (including materials, roof lines and colours). LEPs can also be used to provide statutory protection. For example, Mid-Western Regional Council has listed heritage conservation zones in Gulgong (also a National Trust listed town), Mudgee, Rylstone and Hargraves. The LEP provides some statutory protection to complement listing on Local, State or Federal registers.

Knowledge, Appreciation and Recognition

Councils may also undertake community education and awareness programs to increase the community's awareness of the significance of a site or place. This may include interpretive signage on a historic building or simply placing a heritage order on the site or item.

The Central West CMA has a funded Cultural Heritage program which seeks to improve management and knowledge of Aboriginal heritage. Guided by the Aboriginal Reference Group (ARG), comprised of community members across the catchment, both male and female, the ARG has already undertaken the following projects:

- Undertaken natural resource management training.
- Prepared a schedule of fees for conducting cultural heritage assessment on private property.
- Undertaken cultural heritage assessments as part of a riparian improvement project.
- Assisted with development of the Cultural Heritage Incentive program, providing funding for landholders to identify, protect and preserve values and sites on their properties. (Central West CMA Annual Report 2006/2007)

The Central West Aboriginal Reference Group

The State Government also has indigenous land use agreements which allow for Native Title claimants and the land users to agree to management of the land prior to resolution of a Native Title claim. This may include development activity, access agreements, extinguishment of native title and compensation. The National Native Title Tribunal keeps a register of current agreements, and while there are eight in NSW (340 nationally), none are within the reporting area.

CASE STUDY

Mid-Western Regional Council

Hargraves Courthouse Restoration

Mid-Western Regional Council (MWRC), in conjunction with NSW Heritage Office and the Hargraves Courthouse Advisory Committee (HCAC), has finalised significant conservation works on the Hargraves Courthouse to facilitate the occupation of the building. To fund the works, MWRC applied to the NSW Heritage Office and a succession of grants saw MWRC provided with $80,000 of funds to work toward the conservation of the building.

In order to facilitate works, MWRC sought expressions of interest from the Hargraves community to form the HCAC. The HCAC advised MWRC on the future uses of the site and how the money should be spent. The key principles used to guide works to be undertaken were:

1. Allow occupation of the building for exhibition/ gallery purposes
2. Concentrate some works on the front to demonstrate the progress being made

The HCAC developed a checklist of repairs in August 2006. The following works were outlined as meeting two the core principles:

- Reinstatement of a timber verandah.
- Reinstatement of the fence around the front of the Courthouse.
- Provision of electricity to the Courthouse.
- Provision and repair of stormwater disposal, rainwater collection and a flushing toilet.
- Repair of stonework to the underside of the verandah.
- Provision of new locks and repairs of windows to bring the building to a 'lock up' and secure state.

In addition to the works carried out utilising the grant money, a significant amount of unpaid work was carried out by the HCAC with many 'working bees' conducted on weekends to tidy up the grounds and carry out landscaping works, as well as organising tradespeople and quotes for the conservation work.

The Courthouse is now in a usable state where minor functions and exhibitions take place. The building is accessible to the public and there are facilities on site to enable these functions to take place. Some of the functions that have already taken place include Christmas Carols in 2007 and a poetry reading in February 2008.

Hargraves Courthouse prior to restoration

Hargraves Courthouse after restoration

8 THE SUSTAINABILITY JOURNEY

There are many definitions of environmental sustainability. In essence, it is about conserving natural resources so that the ecological processes upon which we depend are maintained both now and in the future.

The Regional SoE Report, and the previous local Council SoE Reports, help to report on environmental initiatives and regulatory requirements which should improve environmental management by ensuring that there is regular monitoring and gathering of information.

Community involvement is also a key component of sustainability. Councils regularly seek the input and involvement of their local communities by formal and informal means. Formal means include Council committees, surveys, responses to development applications and other documents on public exhibition. Informal means are participation rates in education programs and workshops, discussions with Council staff and responses in local media. The CMAs also gain regular community feedback by similar means.

8.1 Community Needs Survey 2008

The Central West CMA in collaboration with the catchment Councils, developed a community environmental survey for the catchment and reporting area Councils. Of the 17 Councils, data has been returned for 15 and a total of 439 surveys were completed by the community. This survey asked questions about people's environmental behaviours and understanding in the home, and gives some indication of interest areas and knowledge.

The survey is grouped into Garden, Waste and Water and also asks respondents if they are aware of the State of the Environment Report or have read the report. It is interesting to note that even where respondents are aware of the SoE (40% of respondents), few have read the report (19% of respondents) as shown in **Figure 27**. This indicates that Councils need to promote the SoE as a source of environmental information to the wider community, as well as ensuring the report is in a useable format for the community to increase its value as an environmental reporting tool.

Generally, respondents undertook a reasonable range of activities to reduce their household environmental impact. For example, an average of 72% used mulch, compost or used water wise plants in the garden; while 86% state they save water in the home – 70% have dual flush toilets and 60% have a rainwater tank (although only 47% take shorter showers).

The majority of people completing the survey were between 35-50 years old.

8.2 Regional Collaborations

There are several regional collaborations working towards improved environmental management. Many of these have been in place for a number of years and have resulted in significant positive outcomes for the Central West region.

NetWaste

NetWaste is a regional collaboration between Central and Orana Regional Organisations of Councils and sponsored by DECC. NetWaste is focussed on waste and resource management projects, including regional contracts, education programs, knowledge sharing and waste planning at both regional and sub-regional levels.

NetWaste has undertaken projects such as DrumMuster, 'Butt It then Bin It', Community Sharps Management, Household Chemical Waste Collection, Used Oil Recovery, Waste to Art and E-Waste Recycling. NetWaste coordinates workshops for Councils, the community, business and schools promoting waste reduction and recycling.

CentROC

CentROC is comprised of 13 member Councils, and has undertaken a range of projects to help with regional coordination of knowledge and resources across the Councils. This includes training programs, group contracts and coordinating funding for collaborative projects.

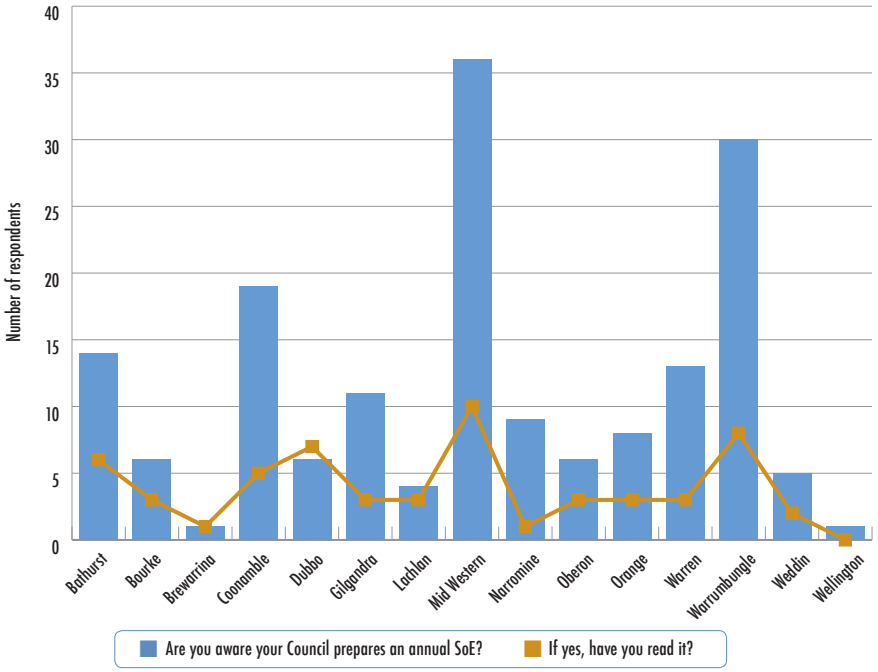
BOD Alliance

The larger Councils of Bathurst, Orange and Dubbo (BOD) have formed an alliance to improve cooperative sharing of knowledge, resources and projects across the three Council areas. One of the first projects for the Alliance has been the development of the BOD Environmental Sustainability Action Plan, which includes six Management Action Plans in the areas of Water, Salinity, Biodiversity, Energy, Waste and Pollution. This is further outlined in a case study in this chapter.

Central West CMA Alliance and Working Groups

The Central West CMA has several community and industry working groups across the region, focussed on areas such as Cultural Heritage and Local Government. These groups provide the community with the opportunity to participate in and give input to catchment wide projects, issues and planning. The Central West CMA also assists with coordination of the Water Quality and Salinity Alliance, a collaboration of Councils working to address these two regional environmental issues.

Figure 27 Respondents aware of the State of the Environment Report



Data from the community survey is listed in Appendix 4.

Figure 28 Councils of the NetWaste region

Source: NetWaste 2008

CASE STUDY

NetWaste

2007/2008 SIMS Metal Waste to Art Regional Exhibition

In June 2008, Parkes Shire Council hosted the finalists of the Central West Waste To Art competition. Created solely from re-used and recycled waste, the incredible art works amazed spectators and also drew awareness to the different ways Australians can reuse their waste.

An initiative of NetWaste, one of eight member groups that comprise RENEW NSW (the voluntary waste management experts focussed on improving waste management in rural and regional NSW), this competition encouraged schools, community groups and individuals to take up the challenge and create a 'new life' for materials that would otherwise have been thrown away and considered useless.

Sponsored by SIMS Metal, the 2007/2008 Waste to Art Regional Exhibition showcased artworks from local competitions across NetWaste's 19 member Councils including the Blue Mountains, Central Darling, Dubbo, Orange, Parks and Warren. A travelling photographic exhibition throughout the NetWaste region commenced in June and featured all works from the Regional Exhibition. It allowed communities the chance to marvel at the talent of the Waste To Art participants and be amazed by the creative uses of a whole lot of 'rubbish.'

'The Waste to Art event has continued to grow this year with 127 artworks on display. This shows that the concept touches something within the community as they acknowledge that Reuse, Reduce and Recycle is an important message' said Sue Clarke, NetWaste Environmental Learning Adviser.

NetWaste
A COLLABORATIVE APPROACH

Winners from the 2008 NetWaste Local Competitions

Left: 'Mexican Cap Dance', Artist: Christine Farmilo, Dubbo
Category: Community 2 Dimensional
'I have been collecting bottle caps for over 12 months, have been desperate and dragged them out from under the crates at the bottle collection points. Old broken pieces of mirror and off cuts of timber were also used'.

Right: 'Coke Of Armour', Artist: Alan Stanger, Dubbo
Category: Community 3 Dimensional
Materials used include: recycled Coke cans

CASE STUDY

CentROC

'That's a Good Idea' Project

This project is funded through the NSW Environmental Trust's Urban Sustainability Program for 3 years. The program aims to:

- Build capacity of Council staff to undertake sustainability projects.
- Reduce the ecological footprint of the region.
- Make compost to improve soil health.

CentROC is working with the member Councils to reduce their ecological impacts through a number of exciting initiatives such as:

The Sustainability Calendar: a quarterly activity that introduces new and more sustainable behaviours into our member Councils such as double sided printing and recycled paper.

The Weather Report: this is a regular newsletter that translates the scientific jargon surrounding human induced climate change. It contains a range of climate facts and figures in plain English and relevant to the local area.

The Compost Cook-Off: The compost cook-off uses Council green waste and turns it into super-food for growing grapes and vegetables. Compost can have significant benefits for soil health and by working with regional vignerons, CentROC Councils have been making compost to raise awareness and interest in composting. This project has been focusing on the use of Council green waste as an ingredient of compost. An event will also be held to promote local produce grown in the compost.

CENTRAL NSW COUNCILS

THE Weather Report

AUGUST 2008

Bought to you by Centroc's That's a Good Idea!

Welcome to 'The Weather Report'. The Weather Report is designed to help explore the science behind human induced climate change. This second edition will focus on explaining the wet weather last summer, giving a basic understanding of climate change models and introducing Ross Garnaut and his series of reports.

Why was it cold and wet last summer?

According to the Bureau of Meteorology website (http://www.bom.gov.au/climate/current/season/nsw/archive/200802.summary.shtml) we had:

- The wettest summer since 1983/1984 for NSW and the Murray Darling Basin;
- Below average maximum temperatures
- Slightly above average minimum temperatures

The rainfall experienced across NSW during last summer was largely a result of the moderate La Niña event (see definitions) in the Pacific Ocean, the effects of which began to be felt in November 2007.

Generally speaking, La Niña's impact on Australian summer rainfall is usually less than the winter-spring impact. However this was not the case last summer. In eastern NSW, there was an increased tendency for wet conditions in summer compared with the winter-spring period. However spring in 2007 was also slightly unusual as we had another warm spring and the average maximum temperature was 1.0°C above historic average. With 2007's warm spring we have now had 12 consecutive springs with above average maximum temperatures.

Definitions

Will Climate Change impact on El Niño-La Niña-SOI?

As can be seen from Figure 1 the El Niño phenomenon is a complex one which is governed by a number of factors including ocean and air circulation currents. So how will global warming or climate change impact on these currents?

The International Panel on Climate Change (IPCC) in a 2007 report concluded that "... there is no consistent indication at this time of discernable changes in El Niño – Southern Oscillation (ENSO) amplitude or frequency in the 21st century."

CSIRO in their latest climate change technical report (CSIRO, 2007) undertook further modelling of ENSO in relation to what the ENSO response to the 20th and 21st century 'forcing' of increased carbon dioxide (CO_2) and the scenarios used by the IPCC in their climate change modelling. The CSIRO concluded that:

"In south-east Australia, El Niño events are projected to become drier and La Niña events will tend to become wetter even if pacific variability linked to El Niño-Southern Oscillation (ENSO) does not increase."

Typical Walker Circulation pattern

Walker Circulation during an El Niño

The Weather Report – a page from a recent edition of the Weather Report newsletter

CASE STUDY

The Bathurst, Orange and Dubbo Environmental Sustainability Action Plan

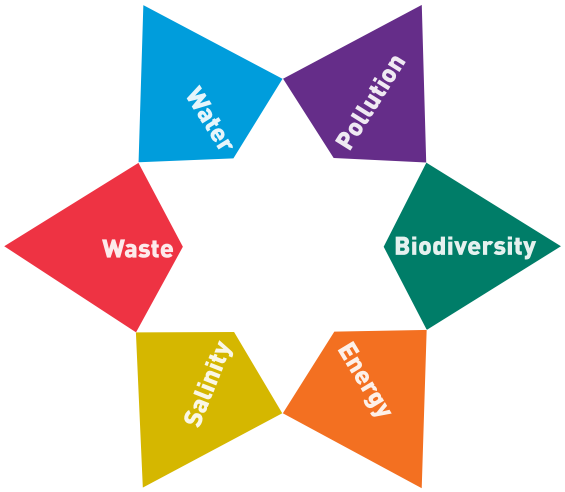
A Memorandum of Understanding was signed by the Bathurst Regional, Orange City and Dubbo City Alliance of Councils in May 2006 to further develop cooperative programs, share resources and improve services to foster sustainability. One of the major projects to arise out of the Alliance is an environmental sustainability action plan.

The Bathurst, Orange and Dubbo Environmental Sustainability Action Plan (the Plan) is a strategic document that sets out principles and actions for progress towards environmental sustainability. The Plan has been funded with $50,000 from the NSW Environmental Trust under the City and Country Environmental Restoration Program. The Central West CMA has also contributed $15,000 to ensure that knowledge gained from the development and implementation of the Plan will be shared with smaller Councils in the region.

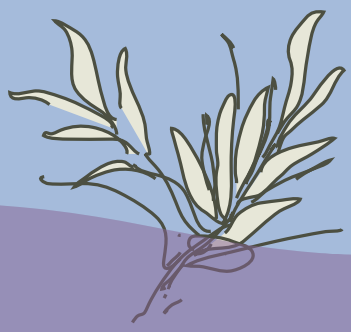
As a first step in the compilation of the Plan, an audit of the existing policies and plans of each Council was undertaken. This helped to establish six priority areas for initial environmental action, including: water, biodiversity, waste, energy, salinity and pollution. A management action plan for each priority area sets out key challenges and opportunities, as well as guiding principles and actions. Climate change and education are seen as integral issues to be addressed within the action plans.

The management actions in the Plan will be reviewed every year and reported through the individual Councils. The delivery and review of actions in the plan shall be managed by staff working teams from the three Councils that are assigned to one of the six management areas.

The Plan will provide a framework for community engagement in sustainability, and recognises that Bathurst, Orange and Dubbo Councils are serious about ensuring a sustainable future for local and broader communities.



The management action plans will ensure a strategic and consistent approach across the Bathurst, Orange and Dubbo Alliance



APPENDICES

Appendix 1

Zoning in the reporting Councils

Council	Zones	Area of each zone (km^2)
Bathurst	Rural	3771
	Residential	19.2
	Business	1.2
	Industrial	5.0
	Special uses	5.1
	Recreation	44.2
Blayney	Residential Zone No 2(v)	9.5
	Rural Zone No 1(a)	1203.7
	Rural Zone No 1(c)	20.6
	Zone No 1(f)	13.4
	Zone No 7(a)	10.3
	Zone No 7(c)	267.5
Bourke	Rural 1a	43103
	Rural 1c	0.8
	Village 2v	1.8
	Township 2t	3.2
	Local Business3c	0.2
	Local Industrial 4a	2.0
	Special Uses 5a	4.2
Brewarrina	1a	No data available
	1c	
	2t	
	8a	
Cabonne	Village	25
	Rural residential	60
	Agricultural	5932
	Industrial - Rezoning Rural to Rural Residential	
Coonamble	Village/Urban 2(v)	12
	Rural Small Holding 1(c)	5
	Open Space 6(a)	2
	Forestry 1(f)	286
	National Park 8	50
	General Rural 1(a)	Remainder

Council	Zones	Area of each zone (km^2)
Dubbo	1b	111.4
	1e	36.1
	2a	12.1
	2b	0.56
	2c	2.8
	2d	6.6
	2e	36.4
	3a	0.31
	3b	0.06
	3c	0.05
	3d	5.2
	3e	1.1
	4a	2.4
	4b	7.2
	4c	2.7
	5a	9.0
	5b	11.5
	6a	7.6
	6b	7.4
	6c	3.4
	1a	2487.4
	1f	499.4
	1l	52.8
	1s	86.3
	2v	2.3
	8	11.6
Gilgandra	No data available	No data available
Lachlan	Village or Urban Zone - Rural 1(a)	No data available
Mid-Western	Agriculture	3968.7
	Commercial Core	0.3
	Conservation	732.3
	General Industrial	0.7
	Infrastructure - Classified Road	3.4
	Infrastructure - Railway	6.6
	Intensive Agriculture	149.7
	Investigation	5.7
	Light Industrial	0.6
	Local Open Space - Private	0.5
	Local Open Space - Public	3.8
	Low Density Residential	1.9
	Medium Density Residential	8.3
	Mixed Use	0.1
	Natural Areas	291.3
	Neighbourhood Business	0.01
	Rural Residential	3.9
	Rural Small Holdings	230.5
	Special Uses (Total)	131.2
	Village	1.6

Council	Zones	Area of each zone (km^2)
Rylstone	Environmental Protection (Recreation)	21.2
	General Rural	2090.5
	Industrial	0.6
	National Park	569.5
	Rural Small Holdings - Rural Residential	2.4
	Rural Small Holdings - Rural Retreat	5.2
	Village	4.6
	Water Catchment	148.0
Merriwa	General Rural	291.3
	National Park & Native Reserve	24.7
	Rural Forestry	59.8
	Village	0.3
Narromine	General Rural 1(a)	No data available
	Rural Small Holdings 1(c)	
	Forestry 1(f)	
	Village 2(v)	
	Industrial 4	
	Special Uses 5	
	Recreation 6	
Oberon	1(a)	No data available
	1c	
	1(d)	
	1(e)	
	Village	
	8	
Orange	Zone 1(a)	67.9
	Zone 1(c)	15.1
	Zone 2(a)	18.0
	Zone 2(v)	0.6
	Zone 2(d)	1.8
	Zone 3(a)	0.4
	Zone 3(b)	0.5
	Zone 3(c)	0.1
	Zone 4	4.8
	Zone 5(a)	2.3
	Zone 5(b)	0.5
	Zone 6	7.8
	Zone 7	178.1
Warren	No data available	No data available
Warrumbungle	Village	No data available
	Rural	
	Residential	
	Small Holdings	
	Agricultural	
	Industrial	
Weddin	Zone 1A	3331
	Zone 1CI	2.0
	Zone 1 CII	2.9
	Zone 1 CIII	9.5
	Zone 2 T	4.8
	Zone 2 V	2.7

Council	Zones	Area of each zone (km^2)
Wellington	Rural 1a	3708
	Intensive Agriculture 1a1	9.6
	Rural Small Holdings 1c	11.3
	Residential 2a	4.0
	Village 2v	3.5
	Business 3	0.4
	Industrial 4	0.6
	Special Uses (PP) 5a	0.8
	Special Uses (Railway)	3.9
	Open Space	60.5
	Environmental Protection	309.3

Appendix 2

Species and communities in the Central West catchment listed under the *Threatened Species Conservation Act 1995*

Scientific name	Common name	Type of species		Level of threat	Known or predicted to occur
Acacia ausfeldii	Ausfeld's Wattle	Plant	Shrubs	Vulnerable	Known
Anseranas semipalmata	Magpie Goose	Animal	Birds	Vulnerable	Known
Antechinomys laniger	Kultarr	Animal	Marsupials	Endangered	Known
Aprasia parapulchella	Pink-tailed Worm-lizard	Animal	Reptiles	Vulnerable	Known
Ardeotis australis	Australian Bustard	Animal	Birds	Endangered	Known
Artesian Springs Ecological Community	Artesian Springs Ecological Community	Community	Threatened Ecological Communities	Endangered Ecological Community	Predicted
Austrostipa wakoolica	A spear-grass	Plant	Herbs and Forbs	Endangered	Known
Baeckea kandos	Baeckea kandos	Plant	Shrubs	Endangered	Known
Botaurus poiciloptilus	Australasian Bittern	Animal	Birds	Vulnerable	Known
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	Brigalow Community	Community	Threatened Ecological Communities	Endangered Ecological Community	Known
Burhinus grallarius	Bush Stone-curlew	Animal	Birds	Endangered	Known
Cacatua leadbeateri	Pink Cockatoo	Animal	Birds	Vulnerable	Known
Callocephalon fimbriatum	Gang-gang Cockatoo	Animal	Birds	Vulnerable	Known
Calotis glandulosa	Mauve Burr-daisy	Plant	Herbs and Forbs	Vulnerable	Known
Calyptorhynchus banksii	Red-tailed Black-Cockatoo	Animal	Birds	Vulnerable	Known
Calyptorhynchus lathami	Glossy Black-cockatoo	Animal	Birds	Vulnerable	Known
Cercartetus nanus	Eastern Pygmy-possum	Animal	Marsupials	Vulnerable	Known
Certhionyx variegatus	Pied Honeyeater	Animal	Birds	Vulnerable	Known
Chalinolobus dwyeri	Large-eared Pied Bat	Animal	Bats	Vulnerable	Known
Chalinolobus picatus	Little Pied Bat	Animal	Bats	Vulnerable	Known
Cheilanthes sieberi subsp. pseudovellea	Cheilanthes sieberi subsp. pseudovellea	Plant	Ferns and Cycads	Endangered	Known
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Animal	Birds	Vulnerable	Known
Coolibah-Black Box woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South bioregions	Coolibah-Black Box woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South bioregions	Community	Threatened Ecological Communities	Endangered Ecological Community	Known
Dasyurus maculatus	Spotted-tailed Quoll	Animal	Marsupials	Vulnerable	Known
Derwentia blakelyi	Derwentia blakelyi	Plant	Shrubs	Vulnerable	Known
Dichanthium setosum	Bluegrass	Plant	Herbs and Forbs	Vulnerable	Known
Digitaria porrecta	Finger Panic Grass	Plant	Herbs and Forbs	Endangered	Known
Diuris pedunculata	Small Snake Orchid	Plant	Orchids	Endangered	Known
Diuris tricolor	Pine Donkey Orchid	Plant	Orchids	Vulnerable	Known

Scientific name	Common name	Type of species		Level of threat	Known or predicted to occur
Ephippiorhynchus asiaticus	Black-necked Stork	Animal	Birds	Endangered	Known
Erythrotriorchis radiatus	Red Goshawk	Animal	Birds	Endangered	Predicted
Eucalyptus alligatrix subsp. miscella	Eucalyptus alligatrix subsp. miscella	Plant	Trees	Vulnerable	Known
Eucalyptus cannonii	Capertee Stringybark	Plant	Trees	Vulnerable	Known
Eucalyptus canobolensis	Silver-Leaf Candlebark	Plant	Trees	Vulnerable	Known
Eucalyptus corticosa	Eucalyptus corticosa	Plant	Trees	Vulnerable	Known
Eucalyptus pulverulenta	Silver-leafed Gum	Plant	Mallees	Vulnerable	Known
Eucalyptus robertsonii subsp. hemisphaerica	Robertson's Peppermint	Plant	Trees	Vulnerable	Known
Euphrasia scabra	Rough Eyebright	Plant	Herbs and Forbs	Endangered	Known
Falco hypoleucos	Grey Falcon	Animal	Birds	Vulnerable	Known
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Animal	Bats	Vulnerable	Known
Fuzzy Box on alluvials of South West Slopes, Darling Riverine Plains & the Brigalow Belt South	Fuzzy Box on alluvials of South West Slopes, Darling Riverine Plains & the Brigalow Belt South	Community	Threatened Ecological Communities	Endangered Ecological Community	Predicted
Goodenia macbarronii	Narrow Goodenia	Plant	Herbs and Forbs	Not listed	Known
Grantiella picta	Painted Honeyeater	Animal	Birds	Vulnerable	Known
Grevillea divaricata	Grevillea divaricata	Plant	Shrubs	Endangered	Predicted
Grevillea evansiana	Evans Grevillea	Plant	Shrubs	Vulnerable	Known
Grevillea obtusiflora	Grevillea obtusiflora	Plant	Shrubs	Endangered	Known
Grus rubicunda	Brolga	Animal	Birds	Vulnerable	Known
Hamirostra melanosternon	Black-breasted Buzzard	Animal	Birds	Vulnerable	Known
Homoranthus darwinioides	Homoranthus darwinioides	Plant	Shrubs	Vulnerable	Known
Hoplocephalus bitorquatus	Pale-headed Snake	Animal	Reptiles	Vulnerable	Known
Hoplocephalus bungaroides	Broad-headed Snake	Animal	Reptiles	Endangered	Known
Indigofera efoliata	Leafless Indigo	Plant	Shrubs	Endangered	Known
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Inland Grey Box Woodland	Community	Threatened Ecological Communities	Endangered Ecological Community	Known
Lathamus discolor	Swift Parrot	Animal	Birds	Endangered	Known
Leionema sympetalum	Rylstone Bell	Plant	Shrubs	Vulnerable	Known
Leipoa ocellata	Malleefowl	Animal	Birds	Endangered	Known
Lepidium hyssopifolium	Aromatic Peppercress	Plant	Herbs and Forbs	Endangered	Known

Scientific name	Common name	Type of species		Level of threat	Known or predicted to occur
Limosa limosa	Black-tailed Godwit	Animal	Birds	Vulnerable	Known
Litoria aurea	Green and Golden Bell Frog	Animal	Amphibians	Endangered	Known
Litoria booroolongensis	Booroolong Frog	Animal	Amphibians	Endangered	Known
Litoria raniformis	Southern Bell Frog	Animal	Amphibians	Endangered	Known
Lophoictinia isura	Square-tailed Kite	Animal	Birds	Vulnerable	Known
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Animal	Birds	Vulnerable	Known
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Animal	Birds	Vulnerable	Known
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Animal	Bats	Vulnerable	Known
Monotaxis macrophylla	Large-leafed Monotaxis	Plant	Herbs and Forbs	Endangered	Known
Mt Canobolas Xanthoparmelia Lichen Community	Mt Canobolas Xanthoparmelia Lichen Community	Community	Threatened Ecological Communities	Endangered Ecological Community	Known
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South western Slopes bioregions	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South western Slopes bioregions	Community	Threatened Ecological Communities	Endangered Ecological Community	Known
Neophema pulchella	Turquoise Parrot	Animal	Birds	Vulnerable	Known
Nettapus coromandelianus	Cotton Pygmy-goose	Animal	Birds	Endangered	Known
Ninox connivens	Barking Owl	Animal	Birds	Vulnerable	Known
Ninox strenua	Powerful Owl	Animal	Birds	Vulnerable	Known
Nyctophilus timoriensis	Greater Long-eared Bat (south eastern form)	Animal	Bats	Vulnerable	Known
Oxyura australis	Blue-billed Duck	Animal	Birds	Vulnerable	Known
Pachycephala inornata	Gilbert's Whistler	Animal	Birds	Vulnerable	Known
Pachycephala olivacea	Olive Whistler	Animal	Birds	Vulnerable	Known
Paralucia spinifera	Purple Copper Butterfly (Bathurst Copper Butterfly)	Animal	Invertebrates	Endangered	Known
Persoonia marginata	Clandulla Geebung	Plant	Shrubs	Vulnerable	Known
Petaurus australis	Yellow-bellied Glider	Animal	Marsupials	Vulnerable	Known
Petaurus norfolcensis	Squirrel Glider	Animal	Marsupials	Vulnerable	Known
Petrogale penicillata	Brush-tailed Rock-wallaby	Animal	Marsupials	Endangered	Known
Phascogale tapoatafa	Brush-tailed Phascogale	Animal	Marsupials	Vulnerable	Predicted
Phascolarctos cinereus	Koala	Animal	Marsupials	Vulnerable	Known
Philotheca ericifolia	Philotheca ericifolia	Plant	Shrubs	Vulnerable	Known
Polytelis swainsonii	Superb Parrot	Animal	Birds	Vulnerable	Known

Scientific name	Common name	Type of species		Level of threat	Known or predicted to occur
Pomaderris brunnea	Brown Pomaderris	Plant	Shrubs	Vulnerable	Known
Pomaderris queenslandica	Scant Pomaderris	Plant	Shrubs	Endangered	Known
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Animal	Birds	Vulnerable	Known
Prostanthera stricta	Prostanthera stricta	Plant	Shrubs	Vulnerable	Known
Pseudomys pilligaensis	Pilliga Mouse	Animal	Rodents	Vulnerable	Known
Pteropus poliocephalus	Grey-headed Flying-fox	Animal	Bats	Vulnerable	Known
Pterostylis cobarensis	Greenhood Orchid	Plant	Orchids	Vulnerable	Known
Pultenaea glabra	Smooth Bush-Pea	Plant	Shrubs	Vulnerable	Known
Pultenaea sp. 'Olinda'	Pultenaea sp. 'Olinda'	Plant	Shrubs	Endangered	Known
Pyrrholaemus saggitatus	Speckled Warbler	Animal	Birds	Vulnerable	Known
Rostratula benghalensis	Painted Snipe	Animal	Birds	Endangered	Known
Rulingia procumbens	Rulingia procumbens	Plant	Shrubs	Vulnerable	Known
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Animal	Bats	Vulnerable	Known
Scoteanax rueppellii	Greater Broad-nosed Bat	Animal	Bats	Vulnerable	Known
Sida rohlenae	Shrub Sida	Plant	Herbs and Forbs	Endangered	Known
Sminthopsis macroura	Stripe-faced Dunnart	Animal	Marsupials	Vulnerable	Known
Stagonopleura guttata	Diamond Firetail	Animal	Birds	Vulnerable	Known
Stictonetta naevosa	Freckled Duck	Animal	Birds	Vulnerable	Known
Suta flagellum	Little Whip Snake	Animal	Reptiles	Vulnerable	Known
Swainsona murrayana	Slender Darling Pea	Plant	Herbs and Forbs	Vulnerable	Known
Swainsona plagiotropis	Red Darling Pea	Plant	Herbs and Forbs	Vulnerable	Known
Swainsona recta	Mountain Swainson-pea	Plant	Herbs and Forbs	Endangered	Known
Swainsona sericea	Silky Swainson-pea	Plant	Herbs and Forbs	Vulnerable	Known
Tylophora linearis	Tylophora linearis	Plant	Epiphytes and climbers	Endangered	Known
Tyto novaehollandiae	Masked Owl	Animal	Birds	Vulnerable	Known
Varanus rosenbergi	Rosenberg's Goanna	Animal	Reptiles	Vulnerable	Known
Vespadelus troughtoni	Eastern Cave Bat	Animal	Bats	Vulnerable	Known
White Box Yellow Box Blakely's Red Gum Woodland	Box-Gum Woodland	Community	Threatened Ecological Communities	Endangered Ecological Community	Known
Xanthomyza phrygia	Regent Honeyeater	Animal	Birds	Endangered	Known
Zieria ingramii	Keith's Zieria	Plant	Shrubs	Endangered	Known
Zieria obcordata	Zieria obcordata	Plant	Shrubs	Endangered	Known

Appendix 3

Declared noxious weeds in the reporting region

Declared noxious weed	Bathurst	Blayney	Bourke	Brewarrina	Cabonne	Coonamble	Dubbo	Gilgandra	Lachlan	Mid-Western	Narromine	Oberon	Orange	Warren	Warrumbungle	Weddin	Wellington	
African boxthorn (*Lycium ferocissimum*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
African feathergrass (*Pennisetum macrourum*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
African lovegrass (*Eragrostis curvula*)	Y	Y			Y							Y	Y					
African turnipweed (*Sisymbrium runcinatum*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
African turnipweed (*Sisymbrium thellungii*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Alligator weed (*Alternanthera philoxeroides*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Anchored water hyacinth (*Eichhornia azurea*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Annual ragweed (*Ambrosia artemisiifolia*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Arrowhead (*Sagittaria montevidensis*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Artichoke thistle (*Cynara cardunculus*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Athel pine (*Tamarix aphylla*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Bathurst/Noogoora/Californian/cockle burrs (*Xanthium* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Bear-skin fescue (*Festuca gautieri*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Black knapweed (*Centaurea nigra*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Blackberry (*Rubus fruticosus aggregate species*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Blue heliotrope (*Heliotropium amplexicaule*)					Y	Y	Y	Y	Y	Y	Y			Y	Y	Y	Y	
Bridal creeper (*Asparagus asparagoides*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Broomrapes (*Orobanche species*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Buffalo Burr (*Solanum rostratum*)					Y				Y							Y		
Burr ragweed (*Ambrosia confertiflora*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Cabomba (*Cabomba caroliniana*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Cayenne snakeweed (*Stachytarpheta cayennensis*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Chilean needle grass (*Nassella neesiana*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Chinese violet (*Asystasia gangetica subspecies micrantha*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Clockweed (*Gaura lindheimeri*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Clockweed (*Gaura parviflora*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Cockle burrs (*Xanthium* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Columbus grass (*Sorghum x almum*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Corn sowthistle (*Sonchus arvensis*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Devil's Claw (*Proboscidea louisianica*) Purple-flowered					Y				Y							Y	Y	

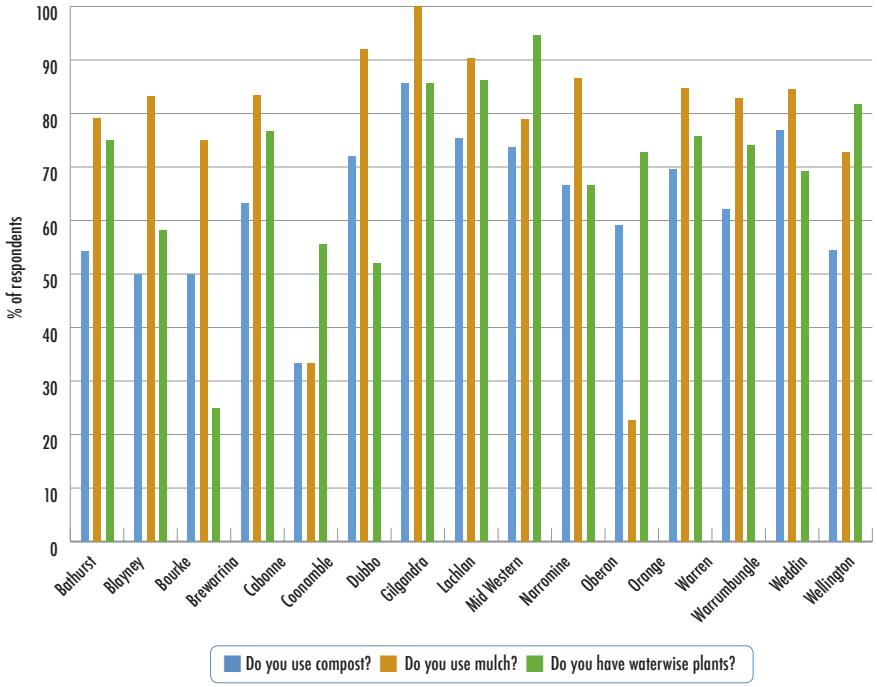
Declared noxious weed	Bathurst	Blayney	Bourke	Brewarrina	Cabonne	Coonamble	Dubbo	Gilgandra	Lachlan	Mid-Western	Narromine	Oberon	Orange	Warren	Warrumbungle	Weddin	Wellington	
Devil's Claw (*Proboscidea louisianica*) Yellow-flowered					Y				Y							Y	Y	
Dodder (*Cuscuta* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
East Indian hygrophila (*Hygrophila polysperma*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
English broom (*Cytisus scoparius*)	Y	Y			Y					Y		Y	Y			Y		
Espartillo (*Achnatherum brachychaetum*)	Y	Y	Y	Y								Y						
Eurasian water milfoil (*Myriophyllum spicatum*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Fine-bristled burr grass (*Cenchrus brownii*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Fountain grass (*Pennisetum setaceum*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Gallon's curse (*Cenchrus biflorus*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Galvanised Burr (*Sclerolaena birchii*)			Y	Y		Y	Y	Y	Y	Y				Y	Y	Y	Y	
Glaucous starthistle (*Carthamus glaucus*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Golden dodder (*Cuscuta campestris*)	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	
Golden thistle (*Scolymus hispanicus*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Gorse (*Ulex europaeus*)	Y	Y										Y	Y					
Green cestrum (*Cestrum parqui*)	Y	Y	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y	
Harrisia cactus (*Harrisia* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Hawkweed (*Hieracium* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Hemlock (*Conium maculatum*)	Y	Y			Y					Y		Y				Y		
Horsetail (*Equisetum* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Hymenachne (*Hymenachne amplexicaulis*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Johnson grass (*Sorghum halepense*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Karoo thorn (*Acacia karroo*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Kochia (*Bassia scoparia*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Lacy Ragweed (*Ambrosia tenuifolia*)										Y								
Lagarosiphon (*Lagarosiphon major*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Lantana (*Lantana* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Leafy elodea (*Egeria densa*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Long-leaf willow primrose (*Ludwigia longifolia*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Long-style feather grass (*Pennisetum villosum*)	Y	Y								Y		Y				Y		

Declared noxious weed	Bathurst	Blayney	Bourke	Brewarrina	Cabonne	Coonamble	Dubbo	Gilgandra	Lachlan	Mid-Western	Narromine	Oberon	Orange	Warren	Warrumbungle	Weddin	Wellington	
Mesquite (*Prosopis species*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Mexican feather grass (*Nassella tenuissima*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Mexican poppy (*Argemone mexicana*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Miconia (*Miconia* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Mintweed (*Salvia reflexa*)						Y		Y		Y				Y	Y		Y	
Mimosa (*Mimosa pigra*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Mossman River grass (*Cenchrus echinatus*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Nodding thistle (*Carduus nutans*)	Y	Y			Y	Y		Y		Y		Y	Y	Y	Y		Y	
Onion grass (*Romulea species*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Oxalis (*Oxalis* species and varieties)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Pampas grass (*Cortaderia* species)	Y	Y			Y	Y	Y	Y		Y	Y	Y	Y	Y	Y		Y	
Parkinsonia (*Parkinsonia aculeata*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Parthenium weed (*Parthenium hysterophorus*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Perennial ragweed (*Ambrosia psilostachya*)										Y								
Pond apple (*Annona glabra*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Prairie ground cherry (*Physalis viscose*)										Y							Y	
Prickly acacia (*Acacia nilotica*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Prickly pear (*Cylindropuntia species*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Prickly pear (*Opuntia* species except *O. ficus-indica*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Privet (Broad-leaf) (*Ligustrum lucidum*)	Y	Y										Y	Y					
Privet (Narrow-leaf/Chinese) (*Ligustrum sinense*)	Y	Y										Y	Y					
Red rice (*Oryza rufipogon*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Rhus tree (*Toxicodendron succedaneum*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Rubbervine (*Cryptostegia grandiflora*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Sagittaria (*Sagittaria platyphylla*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Salvinia (*Salvinia molesta*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Sand oat (*Avena strigosa*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Scotch broom (*Cytisus scoparius*)	Y	Y			Y					Y		Y	Y					

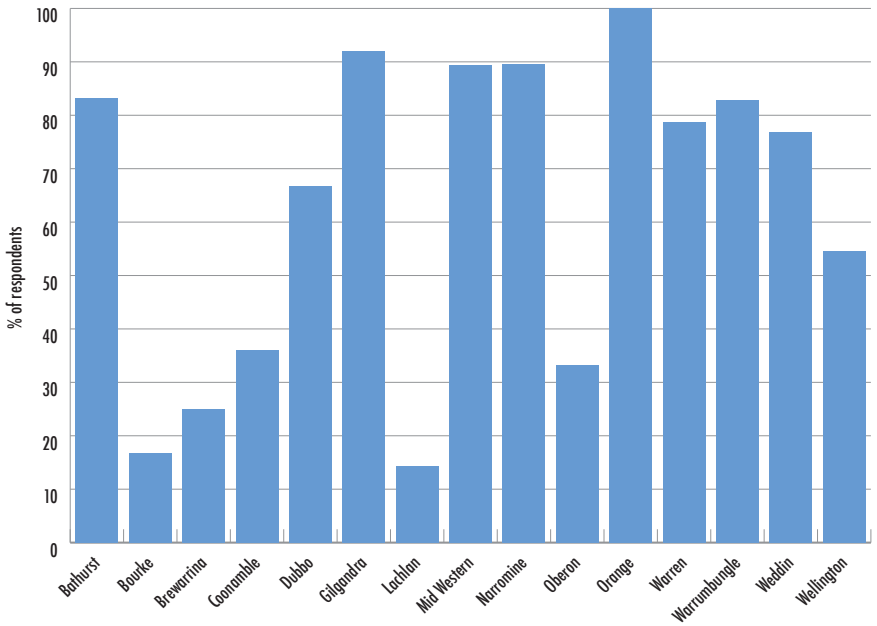
Declared noxious weed	Bathurst	Blayney	Bourke	Brewarrina	Cabonne	Coonamble	Dubbo	Gilgandra	Lachlan	Mid-Western	Narromine	Oberon	Orange	Warren	Warrumbungle	Weddin	Wellington	
Scotch, Stemless, Illyrian and Taurian thistles (*Onopordum* species)	Y	Y			Y				Y	Y		Y	Y					
Senegal tea plant (*Gymnocoronis spilanthoides*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Serrated tussock (*Nassella trichotoma*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Siam weed (*Chromolaena odorata*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Sifton bush (*Cassinia arcuata*)					Y													
Silk forage sorghum (*Sorghum* species hybrid cultivar)					Y	Y	Y	Y	Y	Y	Y			Y	Y		Y	
Silver-leaf nightshade (*Solanum elaeagnifolium*)	Y	Y			Y	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	
Smooth-stemmed turnip (*Brassica barrelieri subspecies oxyrrhina*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Soldier thistle (*Picnomon acarna*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Spiny burrgrass (*Cenchrus incertus*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Spiny burrgrass (*Cenchrus longispinus*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Spotted knapweed (*Centaurea maculosa*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
St. John's wort (*Hypericum perforatum*)	Y	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Star thistle (*Centaurea calcitrapa*)	Y	Y							Y			Y				Y		
Sweet briar (*Rosa rubiginosa*)	Y	Y			Y	Y		Y		Y		Y	Y	Y	Y	Y	Y	
Texas blueweed (*Helianthus ciliaris*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Tree-of-heaven (*Ailanthus altissima*)	Y	Y			Y		Y			Y		Y				Y	Y	
Water caltrop (*Trapa* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Water hyacinth (*Eichhornia crassipes*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
Water lettuce (*Pistia stratiotes*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Water soldier (*Stratiotes aloides*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Wild radish (*Raphanus raphanistrum*)	Y	Y			Y				Y			Y				Y		
Willows (*Salix* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Witchweed (*Striga* species)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Yellow burrhead (*Limnocharis flava*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW
Yellow nutgrass (*Cyperus esculentus*)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	All of NSW

Appendix 4 – Community Survey Results

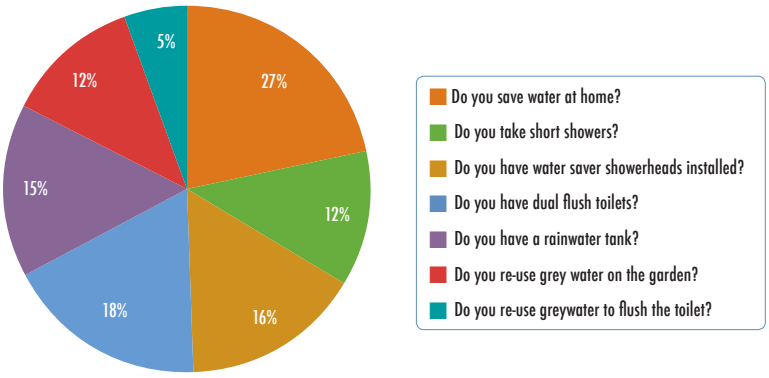
4.1 Percentage of community who practise sustainable gardening methods



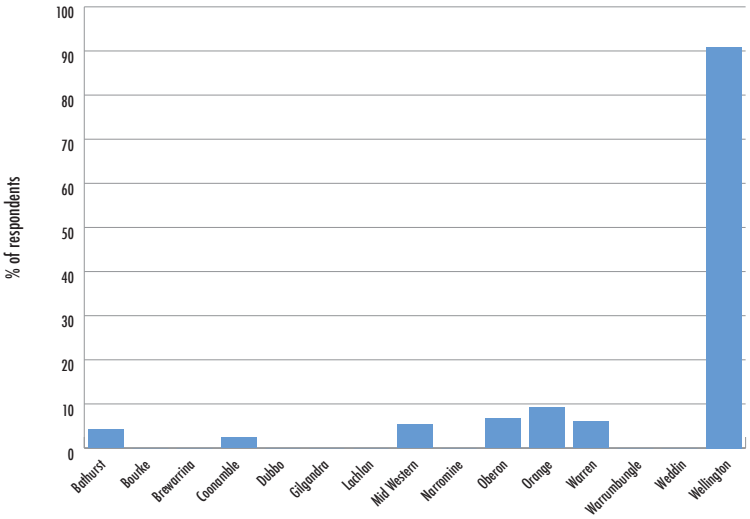
4.2 Percentage of respondents who recycle glass, plastic and paper



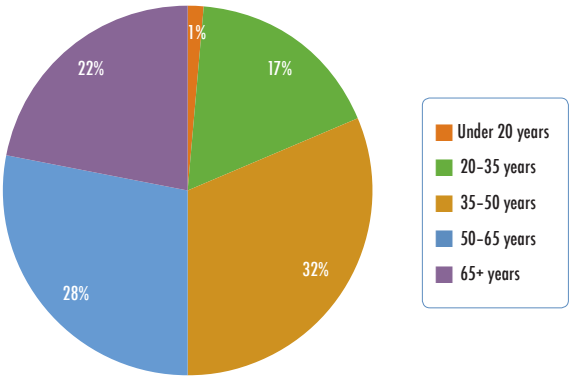
4.3 Percentage of respondents who practise water saving methods



4.4 Percentage of respondents who have converted their vehicle to LPG



4.5 Breakdown of age of respondents across the reporting area



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Wiradjuri saying:
'Ngangaana-gu Kairai billa's
dya Kairai billa's durai
ngangana ngindu'

'Look after the land and the rivers and the land and the rivers will look after you'

(Cec Grant – 2001)