

Regional Comprehensive 2012–2016 STATE OF THE ENVIRONMENT REPORT

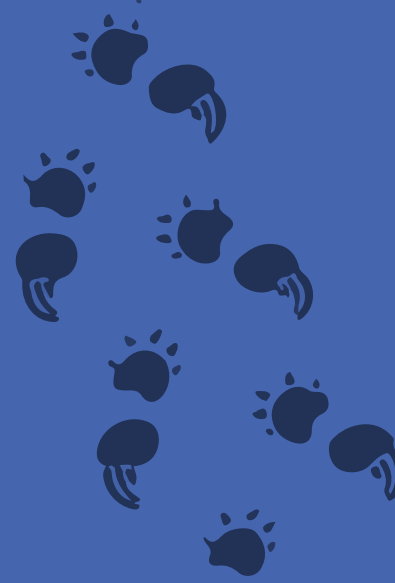


Local Land
Services
Central Tablelands



Local Land
Services
Central West

For the Councils of the
Greater Central West Region of NSW:
Bathurst, Blayney, Bogan, Bourke, Cabonne,
Coonamble, Cowra, Dubbo, Gilgandra,
Lachlan, Mid-Western, Narramine, Oberon,
Orange, Warren, Warrumbungle



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Under the stars at
Mount Oxley
(Simon Bayliss)





Abbreviations

AHIMS	Aboriginal Heritage Information Management System
BPEM	Best Practice Environmental Management
CMA	Catchment Management Authority
CSG	Coal Seam Gas
DCP	Development Control Plan
EC	Electrical Conductivity
EECs	Endangered Ecological Communities
GJ	Gigajoule
GL	Gigalitre
GPT	Gross Pollutant Trap
ha	Hectare
HHW	Household Hazardous Wastes
IP&R	Integrated Planning and Reporting
kL	Kilolitre
km ²	Square kilometres
LBL	Load Based Licensing
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	Local Land Services
mg	milligram
ML	Megalitre
NSW	New South Wales
NTU	Nephelometric Turbidity Units
PM10	Particulate Matter (10 microns or less)
RSoE	Regional State of the Environment
SoE	State of the Environment
TSR	Travelling Stock Reserve
WTP	Water Treatment Plant



Introduction

A State of the Environment (SoE)

Report is an important management

tool which aims to provide the

community and Council with

information on the condition of the

environment in the local area to assist

in decision-making.

Why a Regional SoE Report?

Environmental issues are not restricted to Council boundaries. Regional State of the Environment (RSoE) Reports are recommended by the NSW Government and used by some groups of Councils in NSW to enable a better understanding of the state of the environment in a regional context and to identify future collaborative pathways. More specifically, a regional approach to reporting:

- facilitates a better understanding of the state of the environment across the region
- encourages collaboration in regards to partnering on projects and sharing ideas and resources
- assists in the management of shared environmental resources
- forges stronger regional links across participating Councils.

Who is involved?

The participating Councils in the region are:

- Bathurst Regional Council
- Blayney Shire Council
- Bogan Shire Council

- Bourke Shire Council
- Cabonne Council
- Coonamble Shire Council
- Cowra Shire Council
- Dubbo Regional Council (formerly Dubbo City Council and Wellington 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

Regional SoE reporting has been supported and coordinated by Central Tablelands Local Land Services (LLS)—formally Central West Catchment Management Authority (CMA)—since the first regional report was prepared in 2008. As shown in Figure 1, the participating Councils are located across three LLS regions—Western, Central West and Central Tablelands.

All participating Councils have provided data to be included in this report, with additional regional information sourced by Central Tablelands LLS and Central West LLS and other government agencies (see the Appendix for details of data sources).

Reporting for 2012–2016

Prior to 2009, as a requirement of the *Local Government Act 1993*, all local Councils in NSW produced an annual SoE Report on major environmental impacts, related activities and management plans. In 2007-08 and 2008-09 Councils in the region, along with the Central West CMA collaborated to produce a regional SoE Report based on the requirements of the Act.

In 2009, the *Local Government Act 1993* was amended. The amendments required the use of an Integrated Planning and Reporting (IP&R) Framework to guide a Council's future strategic planning and reporting. As part of the IP&R Framework, Councils were required to develop environmental goals and objectives with their communities in relation to identified priority local environmental issues. These environmental goals and objectives form part of each Council's overarching Community Strategic Plan.

Whilst Community Strategic Plans were being developed by the participating Councils, RSoE Reports were produced under the requirements of the 1993 Act for 2009–10, 2010–11 and 2011–12.

The IP&R Framework requires that Councils prepare annual reports which

include reporting on environmental objectives in their Community Strategic Plans. In the year in which a Council election is held—planned for this year for most Councils—the annual report must also include a SoE Report.

In 2012, the participating Councils and the Central West CMA decided to continue collecting data and reporting on an annual basis so that they could produce a comprehensive RSoE Report in 2016 that covered the intervening years.

Figure 1: Map showing participating Council areas and Local Land Services regional boundaries



OPPOSITE: Reflections on the mirrored surface of the Darling River, Bourke.

This report

The themes covered in this report were guided by those in the then Central West Catchment Action Plan. The themes are:

- Land
- Biodiversity
- Water and Waterways
- People and Communities
- Towards Sustainability

As this is a comprehensive RSoE Report, it includes a description of changes in the past four years related to each Council's environmental objectives.

Use of 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.

In this report, a suite of indicators has been identified that help report on the environmental themes listed above.

Where indicator data for previous years is available, it is provided along with data for 2015–16 in a summary table at the commencement of each theme chapter.

There is a description for each indicator trend within the chapter and an explanation of possible reasons for it occurring. There are also case studies highlighting responses to environmental issues across the region.

The trend arrows in the summary tables are based on comparing the average of data from the past three years with the data for 2014–15, where direct comparison can be made.

The trend arrows used in the summary table are:

- ↑ improvement
- no or little change
- ↓ worsening trend

Council Snapshot Reports

In 2012, the participating Councils decided to produce additional brief snapshot reports for each of their Local Government Areas (LGAs). These Council Snapshot Reports were produced annually from 2013 to 2016. They report on the indicator trends for each LGA.

It should be noted that two Councils were amalgamated prior to the end of June 2016. Dubbo City Council and Wellington Council were amalgamated to form Dubbo Regional Council. The former Dubbo City and Wellington LGAs are still reported on separately in this report to enable trending of data for the past four years. The former LGA's will be labeled throughout the regional and snapshot reports as 'Dubbo City' and 'Wellington'. If the data reported on involves a combination of both the former LGA's then the name 'Dubbo Regional' will be utilised.





The Region



As shown in Figure 1, the 17 Councils (which includes Dubbo City and Wellington Shire Councils being reported on as separate entities) participating in this Regional SOE Report cover a diverse area of Central and Western NSW, totaling approximately 145,169 km². The proportion of the total reporting area covered by each LGA is provided in Figure 2.

The topography of the reporting region ranges from the elevated central tablelands, to the undulating western slopes and then to the largely flat western plains. The region

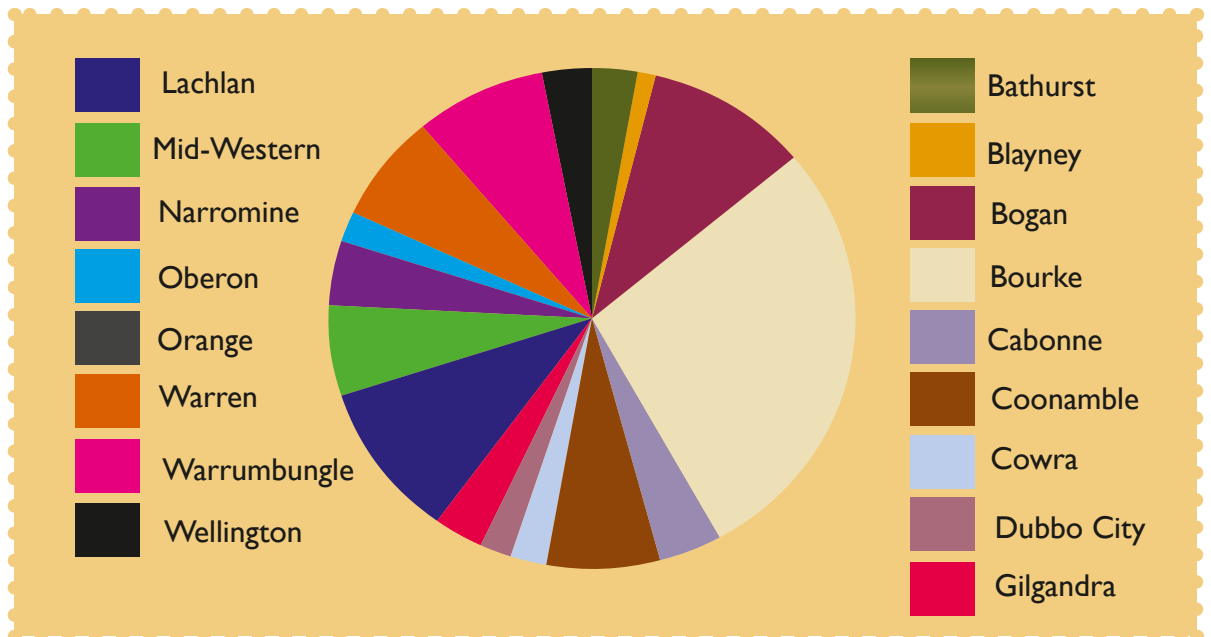
possesses a wide variety of landforms, vegetation species and communities. It incorporates the internationally recognised Macquarie Marshes, the Warrumbungle National Park and important areas of remnant Endangered Ecological Communities (EECs) including Box Gum Grassy Woodland.

The climate of the region is highly variable as it covers a large geographic area and a range of topographies. There is an overall decline in average annual rainfall moving west from the tablelands to the plains. The average

Domestic wind turbine
on the Central Tablelands
(Kevin Diletti)



Figure 2: Proportion of
the total reporting area
by each LGA



daily minimum and maximum temperatures are lowest for the tablelands, intermediate for the slopes and highest for the plains.

The main rivers in the region are the Barwon, Macquarie, Bogan, Cudgegong and Castlereagh. While the upper reaches of the Bogan and Castlereagh Rivers are mostly unregulated, rivers in the Macquarie catchment are largely regulated. Windamere Dam, located on the Cudgegong River near Mudgee, has a capacity of 368,000ML. Burrendong Dam, located at the junction of the Macquarie and Cudgegong Rivers near Wellington, has a capacity of 1,189,000ML. Wyangala Dam on the Lachlan River has a capacity of 1,220,000ML. Smaller dams in the region are Oberon Dam and Carcoar Dam.

There is a wide diversity of landuses across the region including agricultural, residential, commercial, industrial, mining and tourism.

Agricultural landuses vary across the region. The eastern highlands and western plains are dominated by grazing; the slopes and inner plains support extensive winter cropping. Mudgee, Orange and the Bell River floodplain are places of intensive viticulture and horticulture. The Macquarie River floodplain is home to irrigated cotton and other summer crops.

Community profile

The population of the reporting region is 239,055 based on the latest data which was estimated in 2015 (Australian Bureau of Statistics, 2016). Note that the latest census

data collected in 2016 was not available for this report.

A breakdown of the 2015 population data for each LGA in the region is shown in Table 1. It is compared with the 2011 census data. Population density is also provided in Table 1, as is the median age.

Weather 2012–16

Weather conditions drive many of the indicators in this report such as town water use, irrigation water use and water quality. It is therefore important to provide a summary of weather conditions over the past four reporting years in the region.

2011

Although this was prior to the four reporting years, the weather legacy of this year should be noted. According to the Bureau of Meteorology (2011), the Murray-Darling Basin recorded 592.1mm during 2011, above the historical average of 493.4mm and the 13th wettest on record. Rainfall was heaviest in western NSW, mostly associated with record-breaking rainfall in this region between January and March, while central NSW was closer to average. The slow progression of water through the Murray and Darling rivers further impacted western NSW during late January and February.

The high rainfall during 2011 was associated with the lingering impacts of the

strong 2010 La Niña event, in addition to a weak La Niña which developed towards the end of the year.

The average maximum temperature in NSW was 0.3°C above average during 2011, warmer than 2010 but otherwise the coolest year since 2000.

Table 1: Regional population statistics

LGA	2011 Census	2015 Estimate	Pop. Density (per km ²)	Median Age (years)
Bathurst	38,219	42,231	0.11	36
Blayney	6,985	7,380	0.05	40
Bogan	2,900	3,059	0.002	40
Bourke	2,868	2,876	0.0007	36
Cabonne	12,821	13,860	0.02	43
Coonamble	4,030	4,262	0.004	40
Cowra	12,147	12,476	0.04	46
Dubbo City	38,805	41,934	0.12	36
Gilgandra	4,368	4,368	0.009	46
Lachlan	6,476	6,767	0.005	40
Mid-Western	22,318	24,191	0.03	42
Narromine	6,585	6,822	0.01	40
Oberon	5,040	5,318	0.02	43
Orange	38,057	41,809	1.46	35
Warren	2,758	2,901	0.003	45
Warrumbungle	9,588	9,728	0.008	46
Wellington	8,493	9,073	0.02	40
TOTAL	222,458	239,055		

2012

According to the Bureau of Meteorology (2012), rainfall was generally average to above average across most of southern and western NSW.

The 2011–12 La Niña event was the major influence on NSW rainfall at the start of the year. Major flooding was recorded along the Lachlan River, with a peak flood level of 11.8m at Cowra on the 5 March, causing moderate flooding. Minor to moderate flooding was also experienced along the Bogan, Castlereagh and Macquarie systems. There were generally dry conditions for the rest of the year.

Following flooding in southern Queensland in late 2011 and continued heavy rain, floodwaters progressed through the Darling River system during the early part of the year, isolating inland communities and causing major flooding in the Bourke region.

The statewide average temperature for NSW during 2012 was 0.16°C above the 1961–90 average.

2013

The year was generally drier than average in inland NSW, according to the Bureau of Meteorology (2013). The Murray Darling Basin recorded 370.6mm of rainfall, well below the historical average of 488.4mm. However, there were several heavy rain events

during the year, with a cold front causing widespread heavy rain between 28 February and 3 March, including the wettest day on record for Orange.

The statewide mean temperature for NSW during 2013 was 1.23°C above the historical average, the second-warmest on record behind 2009 (+1.37°C).

Widespread bushfire activity impacted the state during January, with 496 bushfires and grassfires recorded between the 7th and 21st. More than 650 000 hectares were burnt and 58 homes destroyed during these fires, as well as substantial damage to the Siding Spring Observatory near Coonabarabran (the Wambelong Fire).

2014

According to the Bureau of Meteorology (2014), New South Wales experienced its warmest year on record in 2014, with several heatwaves and persistently warm conditions across the State. Record-breaking November maximum temperatures reached 45.8°C at Bourke.

Rainfall averaged across New South Wales during 2014 was 465.8mm, 16% below the historical average and the driest year since 2006.

In July, a cold front caused snow down to 600m in the Central Tablelands, leading to the closure of Orange Airport and the Great Western Highway.

2015

According to the Bureau of Meteorology (2015), the statewide total rainfall was very close to the historical average, with above average totals near the coast and in the far west but close to average elsewhere. Inland NSW recorded several heavy rain events in January, June and November. A tornado on 24 August damaged at least 12 properties in Dubbo.

Two East Coast Lows (on 10–12 and 15–17 July) caused cold temperatures and widespread snowfall in the Great Dividing Range, with snow settling on the ground at Orange.

The statewide mean temperature during 2015 was 1.00°C above the historical average, the equal seventh-warmest year on record. Most of the State recorded temperatures in the warmest 10% of years, but no stations broke annual mean temperature records.

2016

The region experienced a variable summer during 2015–16, with a wet stormy January and a very dry February (Bureau of Meteorology, 2016). Both daytime and night-time temperatures were above average, with several heatwaves as well as a cool early January.

The region recorded its warmest autumn on record during 2016. The warmth was widespread, with most stations also recording the warmest autumn mean temperatures on record. Rainfall was below average for the region as a whole.

The most significant rainfall events in inland NSW were associated with a cold front over 30 April–1 May and a strong cut-off low and associated front that produced widespread heavy rain in inland NSW over 8–10 May.

Major environmental threats

There are several major environmental threats to the region that need to be managed to ensure a sustainable future.

Climate change

The NSW Office of Environment and Heritage provides climate projections for the region at its website <http://climatechange.environment.nsw.gov.au/Climate-projections-for-NSW/Climate-projections-for-your-region/Central-West-and-Orana-Climate-Change-Downloads>

Based on long-term (1910–2011) observations, temperatures have been increasing in the region since about 1970, with higher temperatures experienced in recent decades.

The region is projected to continue to warm during the near future (2020–2039) and far future (2060–2079), compared to recent

years (1990–2009). The warming is projected to be on average about 0.7°C in the near future, increasing to about 2.1°C in the far future. The number of hot days is projected to increase and the number of cold nights is projected to decrease.

Projections for the region's annual average rainfall range from a decrease (drying) of 12% to an increase (wetting) of 11% by 2030 and still span both drying and wetting scenarios (-10% to +22%) by 2070. It is predicted that there will be an increase in rain intensity and storm events.

The reporting region currently experiences considerable rainfall variability across regions, seasons and from year-to-year and this variability is also reflected in the projections.

One of the implications of projected climate change in the region is an increased bushfire season duration and intensity (Climate Council, 2015). This could impact the fire regimes of native plant species leading to species loss.

Another implication is that climate change could cause the movement of plant species across the region causing species decline. For example, González-Orozco et. al. (2016) predict that within the next 60 years the vast majority of species distributions (91%) across Australia will shrink in size (on average by 51%) and shift south on the basis of projected suitable climatic space.

Local Councils and government agencies are developing and implementing climate change mitigation and adaptation plans and initiatives to help minimise the impacts to

communities, agriculture and ecosystems in the region. These plans are reported in the Towards Sustainability chapter.

Natural Hazards

There is increasing evidence to show the linkages between climate change and increased extreme weather in Australia (Climate Council, 2014; Climate Council, 2015).

Extreme weather leading to heatwaves, floods and bushfires can have major impacts on the social, economic and environmental conditions in the region. Over the past four years, the region has experienced several natural disasters.

As noted previously, in 2011 and 2012, much of the region experienced above-average rainfall as part of a La Nina event. From December 2011 to March 2012, major floods affected the Lachlan River catchment, with minor flooding experienced in other parts of the region. The total estimated flood damage/remediation bill across the region in 2011–12 was \$14.2 million, with the cumulative cost of flood events between 2010 and 2012 being \$45 million.

In January 2013, an estimated 53,000 hectares was burnt in the Wambelong Bushfire in Warrumbungle LGA. The fire destroyed more than 50 homes and burnt 95% of Warrumbungle National Park. Over 1,000 stock and countless native animals were killed.

With a return to drier conditions between 2012 and 2015, Bourke LGA became drought declared. It also experienced an extensive

bushfire in late 2012 that burnt an estimated 30,000 hectares.

According to the NSW Floodplain Development Manual (DECC, 2005), local Councils have the main responsibility for flood mitigation to attempt to minimise the impacts of flooding particularly to towns and cities. To carry out this obligation, Councils commission flood studies and then develop floodplain management studies and plans. Councils in the reporting region have prepared these studies and plans for some of their waterways and this is reported in the Towards Sustainability chapter.

Local Councils have an important role in bushfire risk management and are part of

local Bush Fire Risk Management Committees. Hazard reduction burning out of fire season is one way to reduce fire risk. The number of hazard reduction burns in the region is reported in the Towards Sustainability chapter.

Population growth and urbanisation

As shown in Table 1, there has been a seven percent increase in population across the region between 2011 and 2015. All LGAs saw some increase in population during that period. However, the three largest regional centres of Bathurst, Orange and Dubbo City

had the greatest rates of population increase.

Movement to the larger towns and cities increases pressure on their existing infrastructure and services including waste (see Towards Sustainability chapter) and water (Water and Waterways chapter). It also requires more housing development including in the peripheries of these centres, placing pressure on land resources (Land chapter) and biodiversity (Biodiversity).

Mining

As shown in the Land chapter the extent of mining operations and exploration has

*Misty morning on the
Central Tablelands
(Kevin Diletti)*



declined over the past four years across the reporting region. In many areas, mining is a major employer bringing many people into the region to work and live. However, the number and scale of active mines can threaten the local environment through possible contamination of groundwater, vegetation clearance and subsidence affecting surface water.

Exploration for Coal Seam Gas (CSG) has been particularly controversial in the region over the past four years due to its potential impacts on groundwater reserves, agricultural land and ecosystems. CSG exploration and production in NSW is subject to some of the most rigorous regulations in the world to ensure the protection of the environment and the safety of our communities. Exploration and production can proceed only after detailed multiagency assessments which address environmental, community, health and water concerns.

The NSW Government has banned several exploration and production practices used in CSG activities in other parts of the world, including using harmful chemicals in the hydraulic fracturing process. It has also banned evaporation ponds to encourage the treatment and re-use of water extracted in the process.

There are currently eight permanently sealed CSG wells in the region, all in Warrumbungle LGA.

Land clearing

The clearing of natural vegetation places pressure on threatened species and ecological communities, removes habitat for native fauna and compounds land degradation problems such as erosion and salinity.

Six percent of the reporting region is protected in the National Parks estate (see Biodiversity chapter). A further two percent of the region is State Forests. However, most of the national parks are in the mountainous areas, with the Pilliga State Forest being the most significant State Forest in relatively flat country. The main stands of remnant vegetation across the slopes and plains are found in less accessible areas, along rivers or in linear reserves such as roadsides, travelling stock reserves (TSRs), rail corridors and utility easements. These linear reserve public lands comprise approximately four percent of the region. Particularly in areas cleared for broadacre farming, they help protect numerous threatened plant species and Endangered Ecological Communities (EECs) such as the Grassy Box Woodland.

With only about another three percent of the reporting region's area covered by urban and other landuses, this leaves about 85% agricultural land. A small proportion of this agricultural land is covered by Wildlife Refuges and Voluntary Conservation Agreements, leaving the potential for further widespread clearing of remnant stands on farms.

Under the *Native Vegetation Act 2003*, clearing of remnant native vegetation or protected regrowth required landholders to seek approval by obtaining a Property Vegetation Plan (PVP) from Local Land Services.

The *Native Vegetation Regulation 2013* was introduced to give greater flexibility for landholders to manage their land as productive and efficient businesses, while still safeguarding natural resources.

Under the Native Vegetation Regulation some clearing can be done under 'self-assessment codes'. Clearing that does not fall within these codes requires a PVP from Local Land Services.

A PVP is a legally-binding agreement between a landholder and Local Land Services that outlines how native vegetation will be managed on a property. Clearing proposals are assessed using an objective, scientifically based, quantitative methodology which is used by Local Land Services to assess whether the proposed clearing will improve or maintain environmental outcomes. It takes into account the losses and gains made through the clearing of native vegetation and if necessary the provision of offsets.

During the reporting period the NSW government commenced a review of legislation which governs biodiversity conservation, native vegetation and threatened species protection.

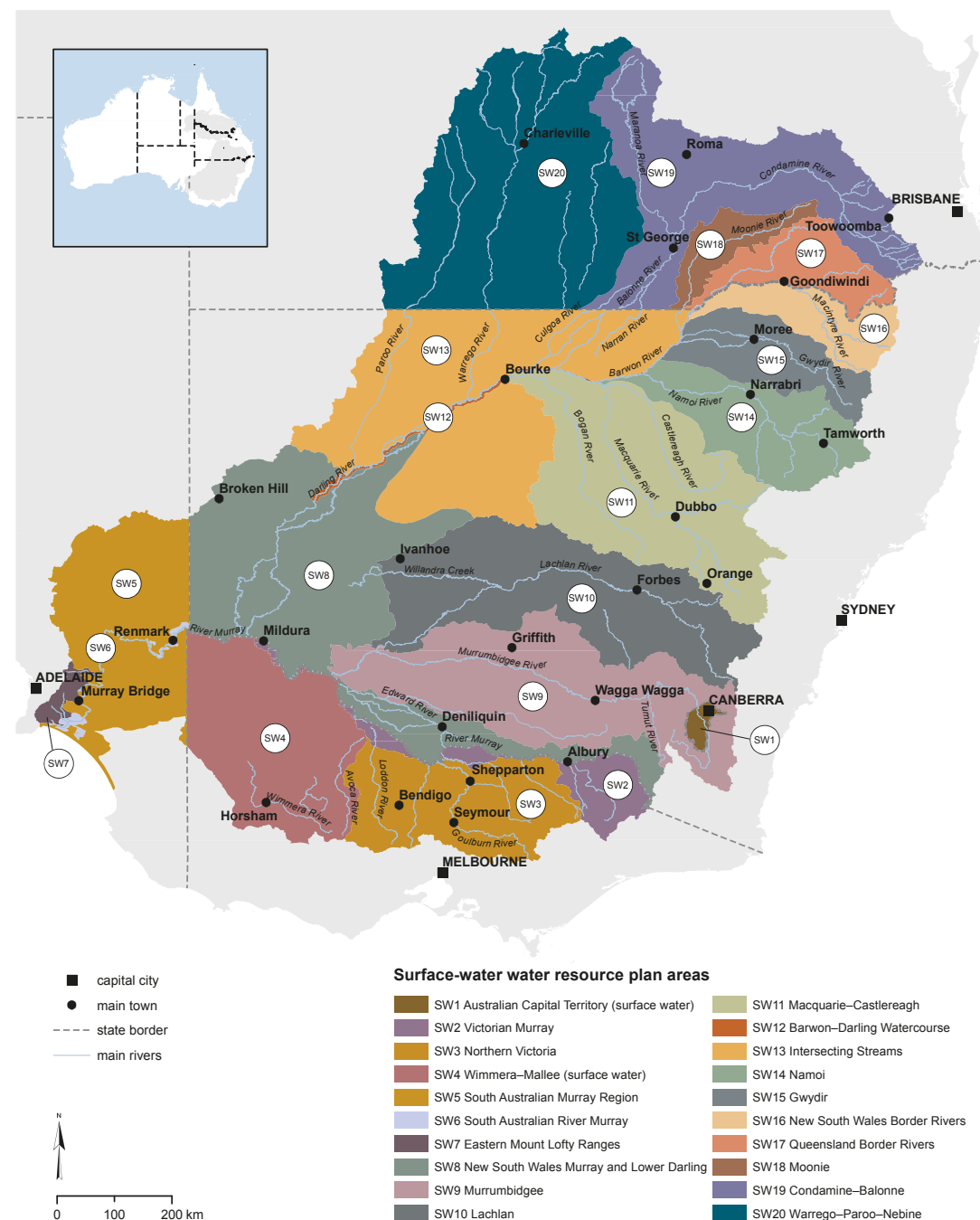
Surface and groundwater extraction

Figure 3: Surface Water Plan Areas in the Murray-Darling Basin
(source: Murray-Darling Basin Authority, 2016)

Irrigation places significant pressures on water resources. Historically, over-allocation of water licences in the region has seen additional stress placed on aquatic habitats such as the Macquarie Marshes, despite the requirement for environmental flows. The demand for groundwater extraction, particularly for irrigation, is increasing in the long term placing additional pressures on aquifers and groundwater dependent ecosystems. Trends in surface and groundwater extraction in the region are provided in the Water and Waterways chapter.

The reporting region is part of a vast inland catchment—the Murray-Darling Basin. The Murray-Darling Basin Plan guides governments, regional authorities and communities to sustainably manage and use the waters of the Basin. The Plan came into effect in November 2012, and it will be reviewed and revised throughout a seven year implementation phase. The overarching aim of the plan is to strike a balance between access to water for Basin communities and provision of adequate water for the environment.

At its heart, the Basin Plan determines the amount of water that can be extracted or taken annually from the Basin for consumptive use (urban, industrial and agricultural). The volume determined is called the long-term average sustainable diversion limit, or a volume of extraction that will limit



the negative impact on the natural environments and the functions of the rivers, waterways, groundwater and wetlands of the Basin.

Water resource plans are documents that set out how water will be managed in an area. Water resource plan areas generally correspond with existing Basin state water management areas. The 36 water resource plan areas in the Basin will cover the 110 surface water and groundwater sustainable diversion limits.

For surface water, as shown in Figure 3 the main water resource plan areas in the reporting region are:

- SW11 Macquarie-Castlereagh
- SW10 Lachlan
- SW13 Intersecting Streams

For groundwater, as shown in Figure 4 the main water resource plan areas in the reporting region are:

- Lachlan alluvium (GW10)
- Lachlan and south western fractured rock (GW11)
- Macquarie–Castlereagh alluvium (GW12)
- New South Wales Great Artesian Basin shallow (GW13)

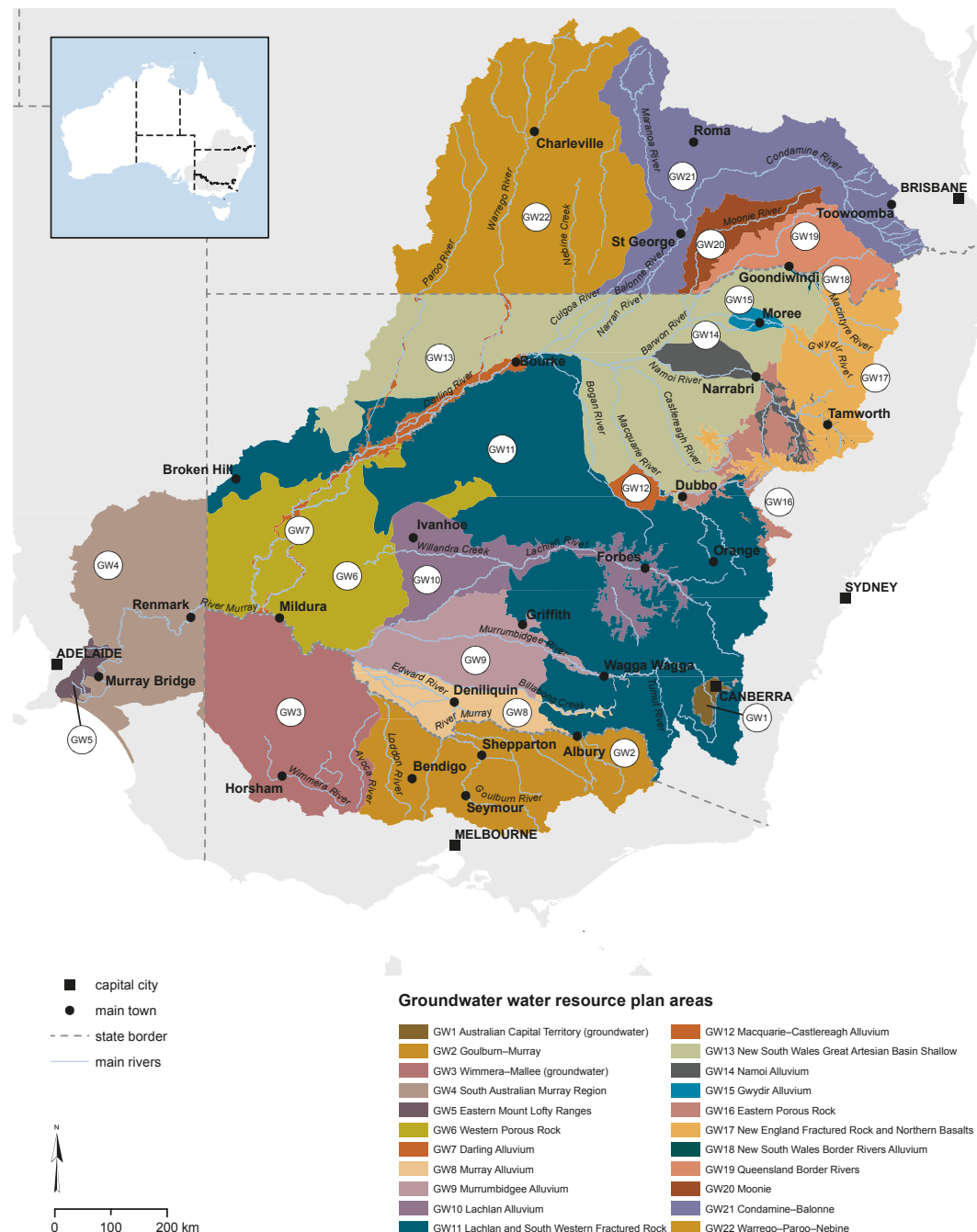


Figure 4: Groundwater plan areas in the Murray-Darling Basin (source: Murray-Darling Basin Authority, 2016)



Environmental Objectives

As this is a comprehensive RSoE Report, a description of changes in the past four years related to each Council's environmental objectives is required.

All Councils in the reporting region have identified environmental objectives or similar (e.g. strategies, outcomes) in their respective Community Strategic Plans. These vary across the region reflecting the different issues perceived by local communities.

A summary of each Council's environmental objectives is provided below and related to a subsequent chapter (noted in brackets) in this RSoE Report.



Barking Owl
(*Ninox connivens*),
Warren LGA

Bathurst

- To promote sustainable and energy efficient growth (Towards Sustainability)
- To protect and enhance the region's landscapes, views, vistas, open spaces and the Macquarie River (Land, Biodiversity, Water and Waterways)
- To protect and enhance the region's biodiversity (Biodiversity)
- To protect the region's unique heritage and history (People and Communities)
- To protect and enhance water quality and riparian ecology (Water and Waterways)

- To minimise the City's environmental footprint (Towards Sustainability)
- To encourage less car dependency (Towards Sustainability)
- To secure a sustainable water supply and raise awareness on water issues (Water and Waterways)
- To encourage sustainable waste management practices, including opportunities for energy generation (Towards Sustainability).

Blayney

- Retention of native vegetation with linking corridors (Biodiversity)
- Biodiversity of waterways (Biodiversity, Water and Waterways)
- Heritage sites in the natural and built environment are identified and understood (People and Communities)
- Sustainable land use practices across the Shire (Land)
- Sustainable waste management (Towards Sustainability)
- Sustainable water, energy and transport sectors to support future growth (Water and Waterways, Towards Sustainability).

Bogan

- The character, liveability and prosperity of our Shire are enhanced through sound urban planning processes and facilitation of developments in accordance with the Bogan LEP (Land, Towards Sustainability)
- Our waste stream is effectively managed, reducing waste to landfill and maximising resource recovery through recycling (Towards Sustainability)
- Our reserves and public places are clean, litter-free and appropriately managed, preserving their valued use, biodiversity and visual amenity whilst protecting our environment from waste and litter pollution (Land, Biodiversity, Towards Sustainability)
- Our local environment is protected from noxious weeds through inspection and control measures in compliance with the *Noxious Weeds Act* (Biodiversity)
- We have access to a secure water supply that is well-managed to provide us with a reliable, safe and cost effective service (Water and Waterways)
- We have a reliable, safe and cost effective sewerage system (Water and Waterways).

Bourke

- Reduce our waste to landfill through effective waste management and recycling (Towards Sustainability)

- Protect local heritage items including significant architecture, indigenous heritage and the natural environment (Biodiversity, People and Communities)
- Ensure active local land care groups (Land, People and Communities)
- Secure a sustainable water and wastewater service for all users (Water and Waterways).

Cabonne

- Manage water supply (Water and Waterways)
- Flood mitigation (Towards Sustainability)
- Manage solid and liquid waste (Towards Sustainability)
- Primary production respecting natural environment (Land, Biodiversity)
- Sustainable natural resource management (Land, Biodiversity, Water and Waterways, Towards Sustainability)
- Alternative energy is considered and used where appropriate (Towards Sustainability).

Coonamble

- Promote local food production through appropriate policies (People and Communities)
- Plan our land use strategically and sensitively (Land)
- Leverage our reliance on land health to promote ecologically and environmentally

- sustainable development (Land, Biodiversity, Towards Sustainability)
- Share knowledge and facilitate knowledge sharing amongst those working on the land (Land, People and Communities)
- Minimise our hard waste production and promote recycling (Towards Sustainability)
- Deliver safe drinking water and sewer services (Water and Waterways)
- Attract investment in alternative energy production (Towards Sustainability)
- Ensure the health of our river system (Water and Waterways).

Cowra

- Make Cowra a centre of environmental excellence (all chapters)
- Build partnerships with people who work with and care for the land to secure a healthy environment (People and Communities)
- Promote practices to encourage Cowra to be an environmentally responsible community (all chapters)
- Provide water, sewerage, stormwater, innovative energy & communication services to meet community needs (Water, Towards Sustainability)
- Secure Cowra's water supply (Water and Waterways).

Dubbo City

OPPOSITE: Viticulture is widespread in Mid-Western and Orange LGA's.

- Environmental Sustainability and Management is a priority for the City (Towards Sustainability)
- Land use management improves and sustains the City's built and natural environment (Land)
- Dubbo's rural areas continue to have the capacity to be a significant contributor to the local, regional and national economy (Land, Biodiversity)
- The Dubbo community has a high standard of living through the provision of a superior water supply (Water and Waterways)
- The community has a high standard of living through the provision of superior sewerage services (Towards Sustainability)
- The community has a high standard of living through the provision of superior waste management services (Towards Sustainability).

Gilgandra

- Develop strategies to activate appropriate preservation of cultural, heritage and natural assets (Biodiversity, People and Communities)
- Minimise the environmental impacts of waste and improve resource recovery rates (Towards Sustainability)
- Work with all stakeholders to mobilise community awareness to take action to

- reduce our ecological footprint (Biodiversity, Water and Waterways, People and Communities, Towards Sustainability)
- Develop appropriate land use planning strategies for sustainable development which embraces the community's unique and valued environment, as well as optimising economic opportunities (Land, Towards Sustainability).

Lachlan

- Reliable high quality water supply (Water and Waterways)
- Increased recreational use of the lakes and rivers (Water and Waterways)
- Secure water licence for agricultural use (Water and Waterways)
- A healthy natural environment (Land, Biodiversity)
- Modern waste management system (Towards Sustainability)

Mid-Western

- Ensure land use planning and management enhances and protects biodiversity and natural heritage (Land, Biodiversity)
- Minimise the impact of mining and other development on the environment, both natural and built (Land, Biodiversity)
- Raise community awareness of environmental and biodiversity issues (Biodiversity, People and Communities)







Bird Hide, Wetlands,
Warren LGA

- Control invasive plant and animal species (Biodiversity)
- Identify and implement innovative water conservation and sustainable water usage management practices (Water and Waterways)
- Maintain and manage water quantity and quality (Water and Waterways)
- Maintain and manage waste water quality to meet Environmental Protection Authority (EPA) standards (Towards Sustainability)
- Educate, promote and support the community in implementing waste minimisation strategies (People and Communities, Towards Sustainability)

- Work regionally and collaboratively to implement strategies that will enhance environmental outcomes in regards to waste management and minimisation (Towards Sustainability)
- Support programs that create environmental awareness and promote sustainable living (People and Communities, Towards Sustainability)
- Respect and enhance the historic character of our Region and heritage value of our towns (People and Communities)
- Consider technologies in Council's facilities, infrastructure and service delivery to reduce our ecological footprint (Towards Sustainability).

Narromine

- To minimise land use impacts on the natural environment (Land, Biodiversity)
- To reduce the impact of a growing population on the environment (Land, Water and Waterways, People and Communities, Towards Sustainability)
- To engage the community in proactive environmental rehabilitation initiatives (Land, Biodiversity, People and Communities)
- Effectively manage the development of our built environment (People and Communities, Towards Sustainability).

Oberon

- Compliance with environmental legislation and guidelines (all chapters)
- Scenic beauty and landscapes are protected (Land, Biodiversity)
- An environment free of weeds and feral animals (Biodiversity)
- Responsible management of natural resources (all chapters)
- Diversified energy sources and usage (Towards Sustainability).

Orange

- Manage the appropriate and sensitive use of the City's natural resource assets and heritage (all chapters)
- Undertake research and review of community aspirations to support the planning and regulation of balanced growth and development (all chapters)
- Foster ideas and opportunities and encourage innovative solutions for the delivery of infrastructure (Water and Waterways, Towards Sustainability)
- Effectively and efficiently maintain and operate current infrastructure to agreed levels of service including any consideration of impacts of climate change (Water and Waterways, Towards Sustainability).

Warren

- Management of the local environment including management of noxious plants (Land, Biodiversity)
- Resource use, waste disposal and management (Towards Sustainability)
- Management of water/wastewater (Water and Waterways)

Warrumbungle

- Local communities have access to effective and efficient waste and recycling services (Towards Sustainability)
- Communities across the Shire are supported by the secure, long term supply of energy and clean water (Water and Waterways, Towards Sustainability)
- National parks and reserves in and around the Shire need to be well-maintained and accessible in the long term for recreational activities (Land, Biodiversity)
- Land use planning across the Shire acknowledges the rural character of the area whilst encouraging ecologically sustainable development (Land, Towards Sustainability).

Wellington

- A strong agricultural sector with increased value adding of locally produced commodities (People and Communities)

- Increased production and use of renewable energy (Towards Sustainability)
- Increased use of our river assets for leisure activities (Water and Waterways)
- All natural resources are managed sustainably (all chapters)
- Roads, buildings, water and sewer reticulation and other infrastructure is maintained and improved to meet the needs of our community (Water and Waterways, People and Communities).

Almost all of the Community Strategic Plans recognise Indigenous communities and heritage (see People and Communities chapter).

Some of the Community Strategic Plans provide performance indicators or measures of success for their environmental objectives or similar. These relate well to some of the 120 indicators analysed in this report. For example, the environmental performance indicators for Dubbo City LGA are:

- Tonnes of waste generated per capita (see Towards Sustainability chapter)
- Tonnes of recyclables diverted from landfill (Towards Sustainability)
- Annual consumption of energy by Council—% reduction (Towards Sustainability)
- Reduction in tonnes of waste received at waste depot—per year or % change per year (Towards Sustainability)
- Average Dubbo household water consumption—% reduction per year (Water and Waterways)

- % reduction in inappropriate native vegetation clearance (per year) (Biodiversity)
- 15% increase in appropriate native vegetation planting (Biodiversity, People and Communities).

For Mid-Western LGA, the environmental performance indicators are:

- An increase in the use of alternative energy sources (see Towards Sustainability chapter)
- An increase in the use of alternative water sources and reduction in consumption of potable water per capita (Water and Waterways)
- A reduction in tonnes of waste to landfill per capita (Towards Sustainability)
- Improved standards of water quality in our waterways (Water and Waterways)
- Reduced damage to our natural environment from Regional economic drivers e.g. mining (Land, Biodiversity).

Box-Gum Grassy
Woodland (Mick Callan)

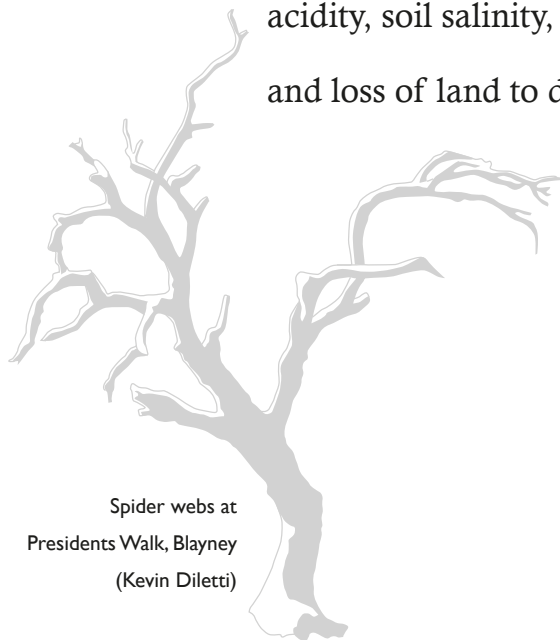


Land

This chapter focuses on aspects of sustainable land management in the region. There are a number of challenges to the sustainable use and management of our soil and land resources, such as wind and water erosion, soil contamination, soil acidity, soil salinity, soil degradation and loss of land to development.

These challenges can be caused by clearing, overgrazing and pollution from a range of sources including disused operations such as petrol stations. The sustainable use of soil and land in agricultural areas of the region is of increasing significance, particularly in the face of a changing climate.

Sustainable land management can be defined as “the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their



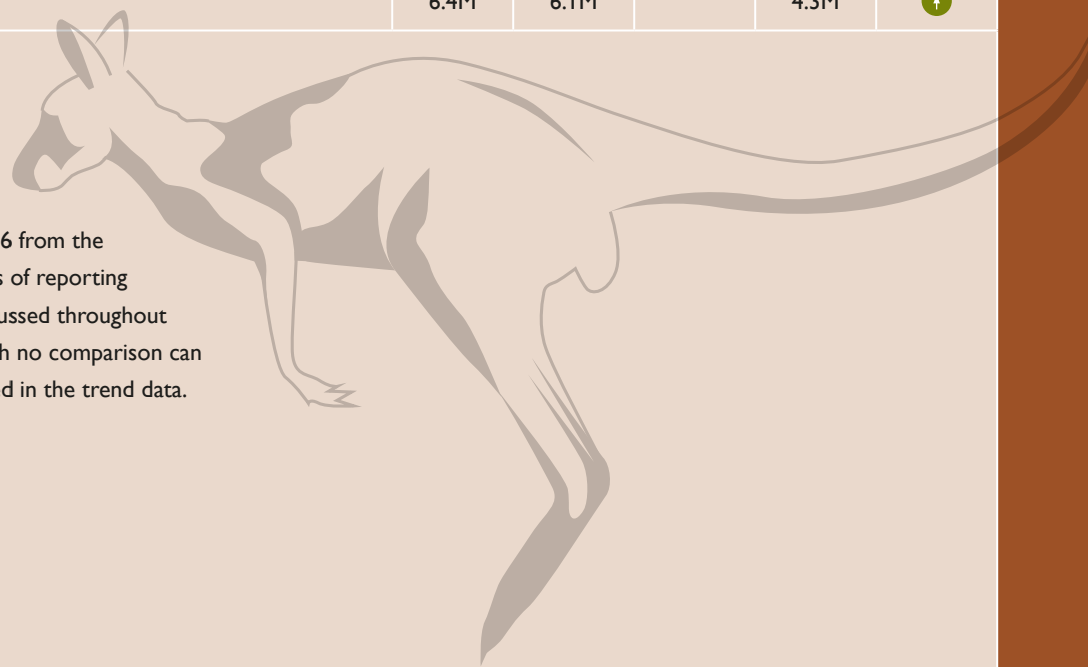
Spider webs at
Presidents Walk, Blayney
(Kevin Diletti)

Table 2: Summary Table of Indicator Trends - Land

Issue	Indicator	2012–13	2013–14	2014–15	2015–16	Trend
Contamination	Contaminated land sites - Contaminated Land Register (number)	10	10	7	7	↑
	Contaminated land sites - potentially contaminated sites (number)	883	1,103	1,122	1,510	↓
	Contaminated sites rehabilitated (number)	14	10	6	10	→
Erosion	Erosion affected land rehabilitated (ha)	1,871	3	3	822	↑
Land use planning and management	Number of development consents and building approvals	3,772	3,917	3,538	3,482	↑
	Landuse conflict complaints (number)	126	97	98	125	↓
	Loss of primary agricultural land through rezoning (ha)	961	1,119	2,235	80	↑
Minerals & Petroleum	Number of mining and exploration titles	667	948	890	871	↑
	Area covered by mining and exploration titles (ha)	6.4M	6.1M		4.3M	↑

- ↑ improvement
- no or little change
- ↓ worsening trend

Note – the above trends are for data in 2012–13, 2013–14, 2014–15 and 2015–16 from the same sources. The trend is based on comparing the average of the previous years of reporting with 2015–16. They should be read in terms of the limitations for indicators discussed throughout this chapter. Note also that there are some new indicators for 2015–16 for which no comparison can be made with previous years. Refer to the Appendix for a list of Councils included in the trend data.



Mt Gundabooka,
Bennetts Gorge,
Bourke LGA.

environmental functions” (Dept. of the Environment, 2014). Sustainable land management is crucial to minimising land degradation, rehabilitating degraded areas and ensuring the optimal use of land resources for the benefit of present and future generations.

Condition

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 NSW Office of Environment and Heritage (OEH) maintains a register of Contaminated Sites (www.epa.nsw.gov.au/clm/aboutclmrecord). All participating Councils also maintain a list of potentially contaminated sites based on past land use.



Indicator – Contaminated land sites (Contaminated Land Register)

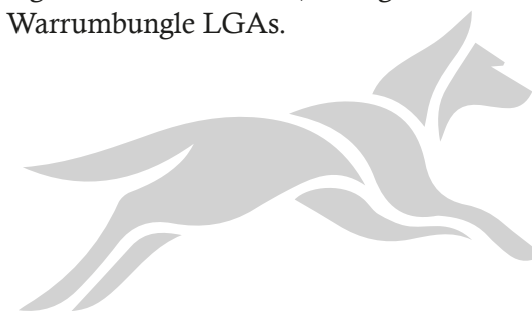
Across the region there were a total of seven sites currently on the Contaminated Land Register at 30 June 2016, unchanged from the previous year. There has been a slight decline in the number of contaminated sites in the past four years.

Indicator – Contaminated land sites (potentially contaminated sites)

The number of potentially contaminated sites reported across the region increased by almost 35% compared to the previous year. The main

reasons for this change were audits of information held by Councils involved in the Contamination Central Project and increased council awareness.

There has been a steady increase in the number of potentially contaminated sites over the past four years. As shown in Figure 5, almost all of the increase in the past year came from new sites identified as part of projects to develop new contaminated land registers in the Bathurst, Orange and Warrumbungle LGAs.



CASE STUDY: Naturally Occurring Asbestos Management (Orange LGA)

Naturally occurring asbestos was discovered in Orange in November 2004 during the stage 3 development of the Narrambla Business Park. Rock from the area, which had been identified as suitable for use in road construction, was being crushed and stockpiled for use on the Northern Distributor Road. In October 2004, a geologist working in a neighbouring site identified serpentinite, which was likely to contain chrysotile (white asbestos). 60,000 cubic metres of gravel had been crushed, of which 20,000 cubic metres remained stockpiled. Sampling undertaken confirmed the presence of chrysotile in the stockpile material. A list was compiled of all sites where the material had been used.

Initial responses to the discovery of the natural occurring asbestos included: laboratory analysis; engagement with WorkCover; a geologist; and a Work Health and Safety consultant to develop protocols for handling the substance. A meeting with all staff was held, and a doctor was engaged to provide advice to staff. A list of employees and contractors that had been working on Narrambla was made and the 'Lung Bus' was used. Staff training, air monitoring, development of planning protocols and a GIS mapping layer was created to assist staff with future planning and current works. Notification of the potential presence of asbestos was issued to the landowners. The stockpiled material was disposed of in the road reserve of the Northern Distributor. A temporary NATA accredited geotechnical lab was set up onsite which was operated by an occupational hygienist during works which were being undertaken. Daily air monitoring occurred whilst works carried out. Throughout the process, daily communication was the major focus specifically with neighbouring industrial and residential users.

There were designated clean or dirty areas, equipment, vehicles etc. as well as dirty clothing being disposed of as asbestos waste. All persons entering sites were trained with correct protocols. As well as shake down bays, prior to leaving the site every vehicle was washed and HEPA vacuumed prior to inspection by the occupational hygienist.

Currently, the focus is on learnings over the past 11 years as well as utilising practical, tried and tested measures and procedures to manage the naturally occurring asbestos in Narrambla. Council has kept information based on local conditions for further use (including areas that have been predicted to contain serpentinite). "Education Areas" are implemented near serpentinite areas.

There have been newly found naturally occurring asbestos areas that are awaiting Industry and Investment release of new mapping.

For the future, a review and update of Council's 2014 Asbestos Management Plan will allow for new state mapping and possibly expanded areas. Along with this will come the ability to improve information quality and communication style for the community and the construction industry.

Ongoing monitoring of sites will occur as well as the finalisation of Council's GIS mapping of disposal areas.



Wentworth and Reform Shafts looking southwest, showing the extensive waste rock dumps. (Source: Sheridan Collection, Mitchell Library)

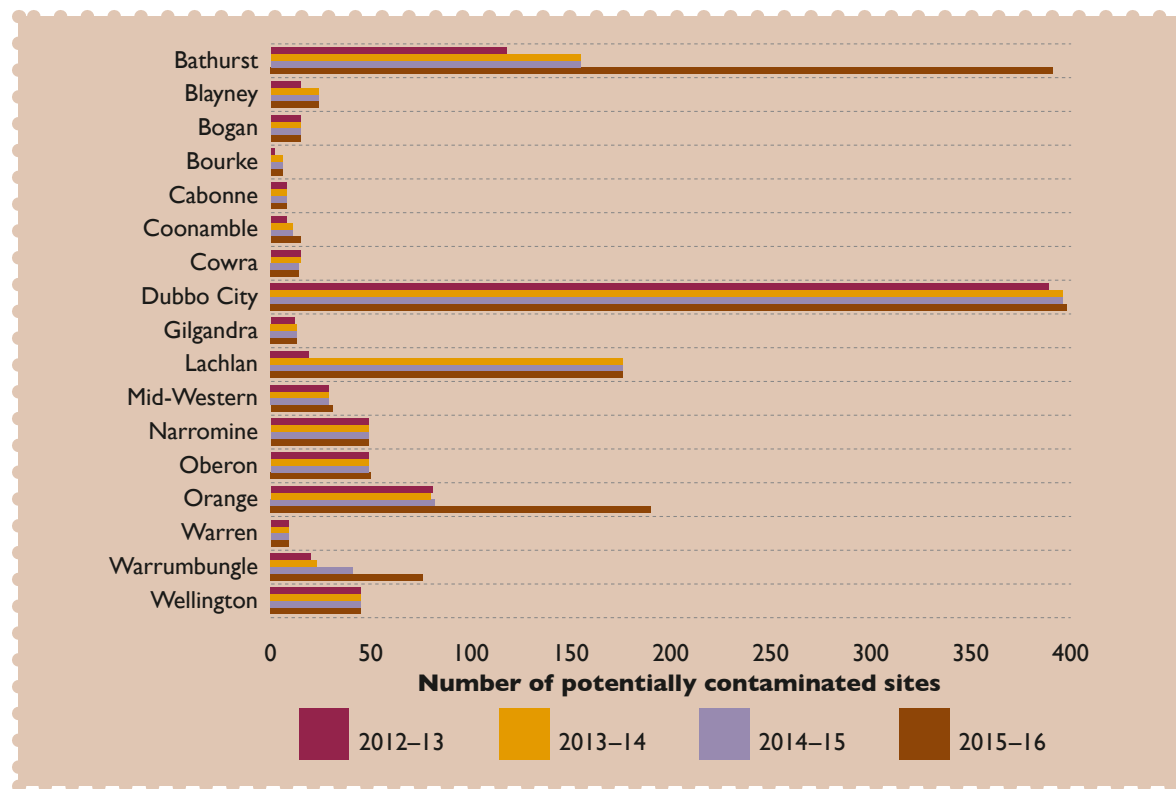


Figure 5: Number of potentially contaminated sites across the region

Erosion

Erosion is a significant land factor that influences water quality in our streams and terrestrial and aquatic habitat quality. 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 arable land and

habitat, weed invasion, soil loss, dust storms and sedimentation of waterways.

Threats

The main threats to the Land resources in the region are:

1. Land clearing
2. Poor agricultural practices
3. Development and land use that may be inappropriate to the natural environment (e.g. mining)

4. Climate Change
5. Natural Hazards

These threats have been discussed earlier in this report. There are several indicators to measure the threats related to development and land use as analysed below.

Development and land use

Development in and around urban areas can impact significantly on the natural environment including clearing for building blocks. On the other hand, there can be economic and social benefits to a community from increased development activity.

Indicator – Number of development consents and building approvals

As shown in Figure 6, development activity in the region declined by 1.6% in 2015–16, with the number of development consents and building approvals across the reporting region falling to the lowest level since 2010–11. The most notable declines were in the Cabonne, Mid-Western and Orange LGAs, with the latter two now showing four successive years of declining approvals since their peak in 2011–12.

However, the peaks in these LGAs were most likely fueled by the expansion of mining in the areas. There were some signs that the declining trend for development may be nearing its end, with increases reported by

Blayney, Bogan, Narromine, Warrumbungle and Wellington LGAs. There was also a small increase this year in Commercial and Industrial approvals across the region, after last year falling to their lowest level since at least 2008–09.

Increased development can cause an increase in the number of landuse complaints to the Councils in the region. For example, in 2013–14 increases in the number of landuse complaints in Orange LGA were due primarily to two new major housing subdivisions. However, issues may also arise due to new zoning of land or conflict with new property owners.

Indicator – Landuse conflict complaints

As shown in the summary table, the level of landuse complaints has returned to the 2012–13 figure. There was a 28% increase in the number of landuse conflict complaints across the reporting region this year. Seventy-nine percent of the complaints were recorded in just four LGAs: Cowra, Dubbo City, Mid-Western and Orange. However, 12 of the 17 councils reported complaints: more than in any previous year. The level of complaints in Cowra continues to be comparatively high in proportion to its level of development activity.

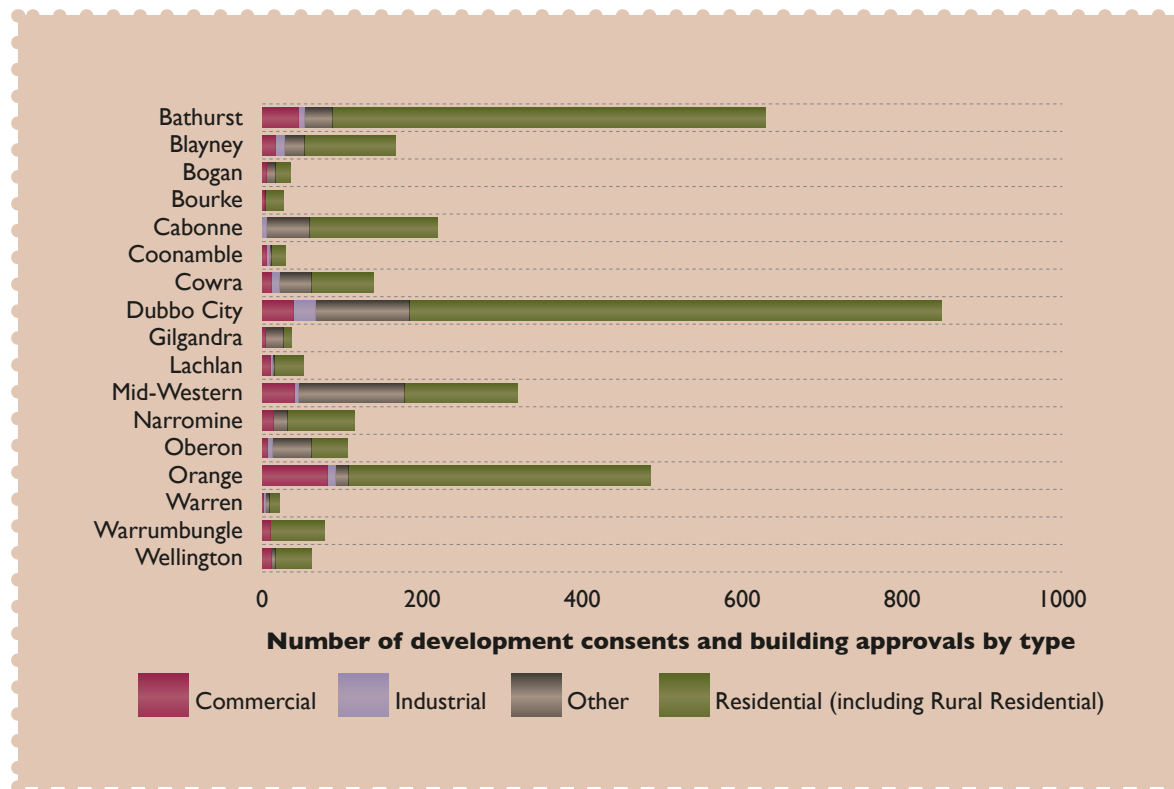


Figure 6: Number of development consents and building approvals by type 2015–16

Indicator – Loss of primary agricultural land through rezoning

In the past four years, by far the most primary agricultural land was lost through rezoning in 2014–15. This was mainly in Bathurst LGA where the new LEP was gazetted in that year.

Only 80 hectares was reported as rezoned from rural to other categories in the last year. All of this was in the Bourke LGA.

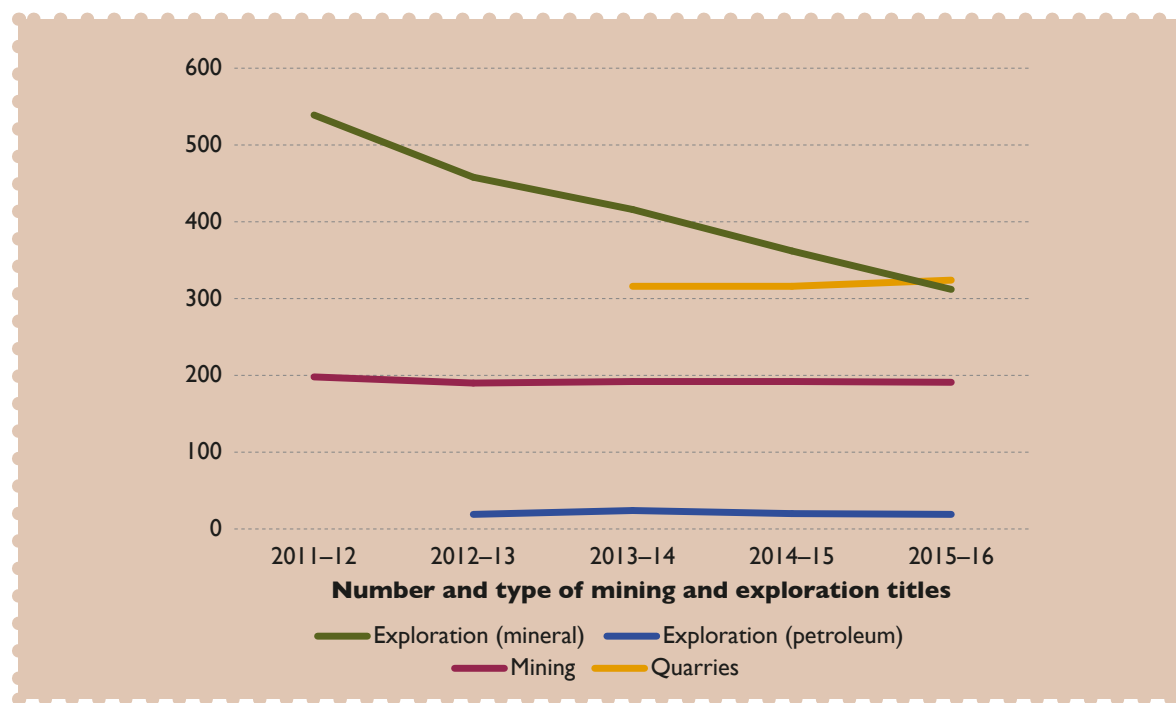
The loss of agricultural land through rezoning can have deleterious environmental impacts. Not only may the agricultural land

have economic value but it could contain remnant native vegetation which may be lost as a result of development following rezoning.

Mining

The boom in global demand for Australian resources continued to have a significant impact on the economy of the Central West of NSW, although this started to wane particularly in the past two years. In many areas, mining is a major employer and exploration

Figure 7: Number and type of mining exploration titles in the reporting region



for new commercial deposits is widespread across the region. The resources industry provides job opportunities for many people who in other times would have been forced to leave the region to find work and it also brings new people into the region. This diversity can provide social benefits in terms of employment and wealth creation, but may also negatively impact on the social structure of some smaller regional centres. The number and scale of active mines and exploration projects can threaten the local environment through vegetation clearance, possible contamination of groundwater, and subsidence which may affect surface water.

OPPOSITE: A blast at Wilpinjong Mine, Mid-Western Region.

Indicator – Number and type of mining exploration titles

Indicator – Area covered by mining and petroleum exploration projects

As shown in Figure 7, the underlying trend when comparing like-for-like data since 2010–11 for both number of titles and area covered is a continuing decline in operating mines and exploration projects, with the number of titles declining by over 9% compared with 2014–15. The area covered by extractive industries and mining exploration projects is shown in Figure 8. It declined by over 30% compared to 2013–14 which is the

last comparable year (data was incomplete for 2014–15).

This is consistent with the nationwide slow-down in the mining industry since the peaks at the height of the boom in commodity prices.

Response

Contamination

A range of projects have been undertaken across the reporting area in the past four years to address contamination. Responses include research to locate and identify contaminated sites, and on-ground works to address contamination issues.

In 2014, Bathurst Regional Council as part of an Environment and Waterways Alliance application secured a \$450,000 grant from the NSW EPA to assist with capacity building in member Councils in the area of contaminated land management. The project is providing training and assistance in policy and framework development across 19 Councils.

Indicator – Contaminated sites rehabilitated

The number of contaminated sites rehabilitated per year has remained relatively constant over the past four years ranging between six and 14.

Ten contaminated sites were reported as rehabilitated across the region in 2015–16,





including four former rural waste facilities in the Gilgandra LGA which have now been capped and rehabilitated. Comparing this year's remediation activity with the 1,510 potentially contaminated sites across the region, highlights the scale of the task ahead for Councils and communities.

Erosion

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 eroded material leaving the site, and to keep and stockpile topsoil for rehabilitation purposes.

Councils and LLS conduct projects to rehabilitate eroded lands. Rehabilitation can include earth works, native plant revegetation (e.g. through planting and direct seeding) and regeneration (e.g. through fencing to remove stock).

Indicator – Erosion affected land rehabilitated

The Central West LLS reported that 822 hectares were rehabilitated in the last year through waterponding sites set up in the rangelands. This is considerably less than in 2012–13 when 1,871 hectares was rehabilitated. No rehabilitation by Councils was reported this year, continuing to reflect a lack of priority and funding for work in this area.

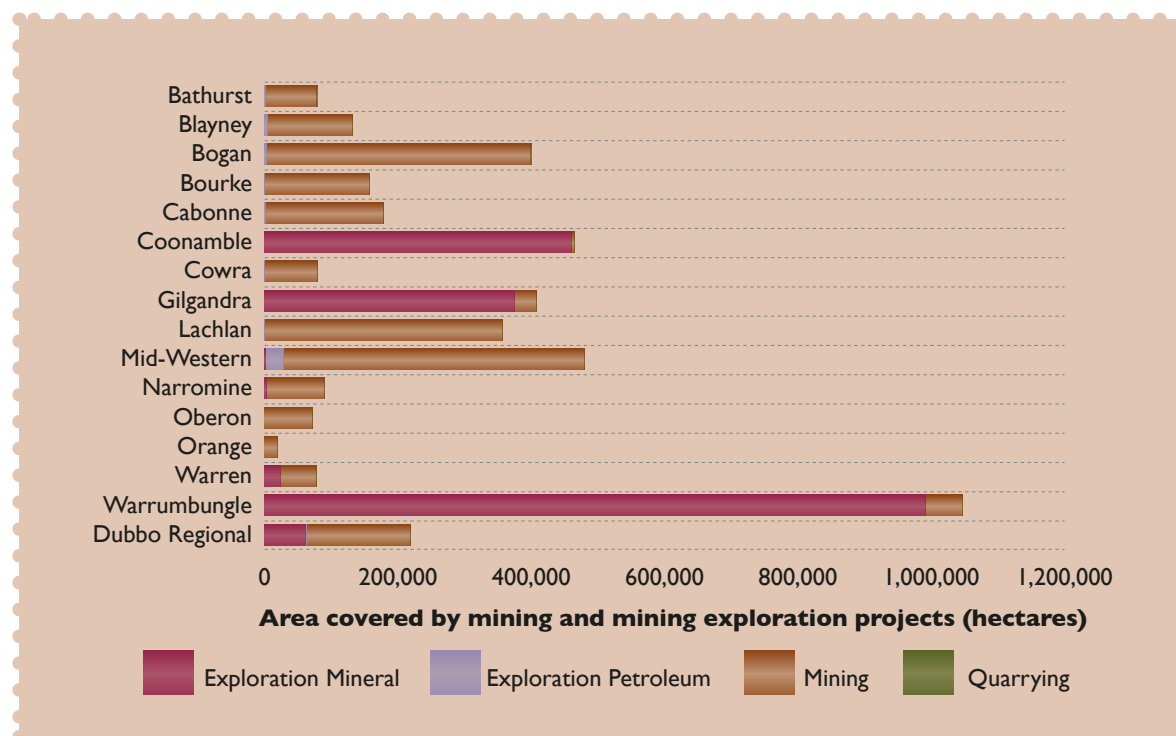


Figure 8: Area covered by mining and petroleum exploration projects 2015–16

Sustainable agricultural practices

Sustainable agricultural practices benefit the environment by minimising wind and water erosion, soil structure decline, organic carbon loss and salinity. These practices include understanding land and soil capability, non-tillage farming systems and crop and stock rotation.

Indicator – Farm entities demonstrably practicing sustainable agricultural practice

The Central West LLS and Central Tablelands LLS reported that the land area used for sustainable agricultural practice is a total of 24,754 hectares which is by far the highest area reported for this indicator since it was first reported in 2012–13. It is not possible to draw any trend for this indicator due to the very inconsistent data reported from year to year.

OPPOSITE: Cotton fields, Bourke LGA.





Biodiversity

Biodiversity is the variety of all life forms on earth - the different plants, animals and micro-organisms and the ecosystems of which they are a part.

Fish River restoration work will control noxious weeds that will improve biodiversity values at the site.

Biodiversity is critical to maintaining functioning ecosystems which provide important services upon which all life depends.



Ecosystems that are rich in biodiversity are more resilient and healthy and are better able to recover from outside stresses such as drought, pests, bushfire and climate change.

Understanding biodiversity gives us the ability to more effectively address environmental challenges including:

- controlling pests and supporting species that pollinate crops
- maintaining groundwater tables
- absorbing carbon
- protecting water quality.

Local Councils may impact on biodiversity through a variety of activities including landuse planning and the management of Council reserves.

Condition

Loss of Biodiversity

It is estimated that there is only 38% of native vegetation/animal habitat remaining in the Central West region but this is not evenly distributed – 62% of the land area has no remaining native vegetation (Goldney, Kerle and Fleming, 2007). It is therefore imperative that existing remnants are preserved. Reserving land in the National Park estate is one important way biodiversity can be protected. State Forests also help conserve remnant native vegetation and biodiversity although this is dependent on the sustainability of the logging regime and whether the forest is now used for

Table 3: Summary Table of Indicator Trends – Biodiversity

Issue	Indicator	2012–13	2013–14	2014–15	2015–16	Trend
Habitat Loss	Total Area in the National Park estate (ha)			799,973	799,926	→
	Total Area of State Forests (ha)			239,641	234,589	↓
	Total Area Protected in Wildlife Refuges (ha)	217,000	217,000	215,000	215,000	→
	Total Area protected under voluntary conservation agreements (ha)	10,292	10,434	12,023	12,090	↑
	Proportion of Council reserves that is bushland/remnant vegetation	46%	46%	46%	45%	→
	Habitat areas revegetated (ha)	172	164	48	54	↓
	Vegetation protected and rehabilitated through LLS incentive funding (ha)	7,496	7,214	5,302	95,645	↑
	New Voluntary Conservation Agreements, Property Vegetation Plans & biobanking (number)	5	2	75	63	↑
	Roadside vegetation management plans	10	10	10	17	↑
	Roadside vegetation rehabilitated (ha)			76	15	↓
Threatened Species	State Threatened species listed in LGAs (number)	287	283	279	288	↓
	Threatened species actions implemented (e.g. PAS, recovery plans) (number)	28	15	16	14	↓
	Fish restocking activities: native species (number)	391,000	560,000	505,000	905,000	↑
Noxious weeds and feral animals	Fish restocking activities: non-native species (number)	285,000	306,000	293,000	340,000	↓
	Number of declared noxious weeds	122	124	139	139	↓
	Invasive species (listed noxious or WONS) under active management (number)	189	191	193	205	↑

 improvement
  no or little change
  worsening trend

Note – the above trends are for data in 2012–13, 2013–14, 2014–15 and 2015–16 from the same sources. The trend is based on comparing the average of the previous years of reporting with 2015–16. They should be read in terms of the limitations for indicators discussed throughout this chapter. Note also that there are some new indicators for 2015–16 for which no comparison can be made with previous years. Refer to the Appendix for a list of Councils included in the trend data.

softwood plantations. Local Councils also protect remnant bushland in their reserve system.

Linear reserves, such as roadsides, rail corridors, TSRs and utility easements, crisscross the landscape. They can be the only areas of remnant vegetation in broadacre farming districts. However, they are prone to loss of biodiversity due to road construction and maintenance, weed invasion, illegal firewood gathering, inappropriate fire regimes and illegal dumping.

Private land conservation is critical to biodiversity preservation as agricultural land comprises most (approximately 80%) of the region's landscape. Wildlife refuges and conservation agreements are the main ways to conserve native remnant vegetation on private properties.

Old tree,
Macquarie Park,
former Wellington

LGA.

Indicator – Total area in the National Parks Estate
Indicator – Addition to the National Park estate

The National Park estate includes national parks, nature reserves, state conservation areas and regional parks. Due to a change in the method of calculating the area of the National Park estate, comparable data is only available for 2014–15 and 2015–16.

The total area of the National Park estate in the reporting region is 799,926 hectares which is slightly less (47ha) than the area reported last year. This is most likely due to issues with spatial data used in this report and should not be viewed as a loss in the National Park estate across the region.



Indicator – Total Area of State Forests
Indicator – Change in Area of State Forests

Due to a change in the method of calculating the area of State Forests in the region, comparable data is only available for 2014–15 and 2015–16.

The total area of State Forests in the reporting region is 234,589 hectares, which is a decrease of just over 5,000 hectares from the 2014–15 total. This is likely due to issues with spatial data used in this report.

Indicator – Total Area protected in Wildlife Refuges

The Wildlife Refuges scheme has existed since 1948 and is one of the longest-running schemes in Australia that supports conservation on private and public land. Wildlife refuges may contain remnant native vegetation, as well as habitat provided by wildlife corridors, windbreaks, woodlots or farm dams.

The total area protected in Wildlife Refuges on private property has remained relatively constant over the past four years.

CASE STUDY: Restoring Regent Honeyeater Habitat in the Bathurst Region (Bathurst LGA)

The Regent Honeyeater (*Xanthomyza Phrygia*) is listed as Critically Endangered in NSW, and has been sporadically recorded in Bathurst. Habitat loss is the major threat to this species which is known to occur in Casuarina Gallery Forest and Box Gum Grassy Woodland. These ecological communities are present in the Bathurst region, yet healthy examples of either community are rare due to historic clearing and agricultural use

The “Restoring Regent Honeyeater habitat within the Bathurst Region” project aims to restore Casuarina Gallery Forest along 1,000 metres of the Macquarie River utilising plant species known to be associated with the Regent Honeyeater. To date, dense Willows have been removed from the riverbank and replaced with several thousand native trees, shrubs and grasses.

Additionally, a seed production area has been established using local provenance plants from the Casuarina Gallery Forest and Box Gum Grassy Woodland communities. These plants will provide seeds for future revegetation projects.

The project has been received positively by the community, with volunteer plantings days achieving high attendance rates, reflecting community ownership of the project and the parkland area.

The project has been funded by the NSW Environmental Trust through its Restoration and Rehabilitation program.



Regent Honeyeater (*Xanthomyza Phrygia*)

Dean Ingversen, Birdlife Australia

Indicator – Total Area protected under voluntary conservation agreements

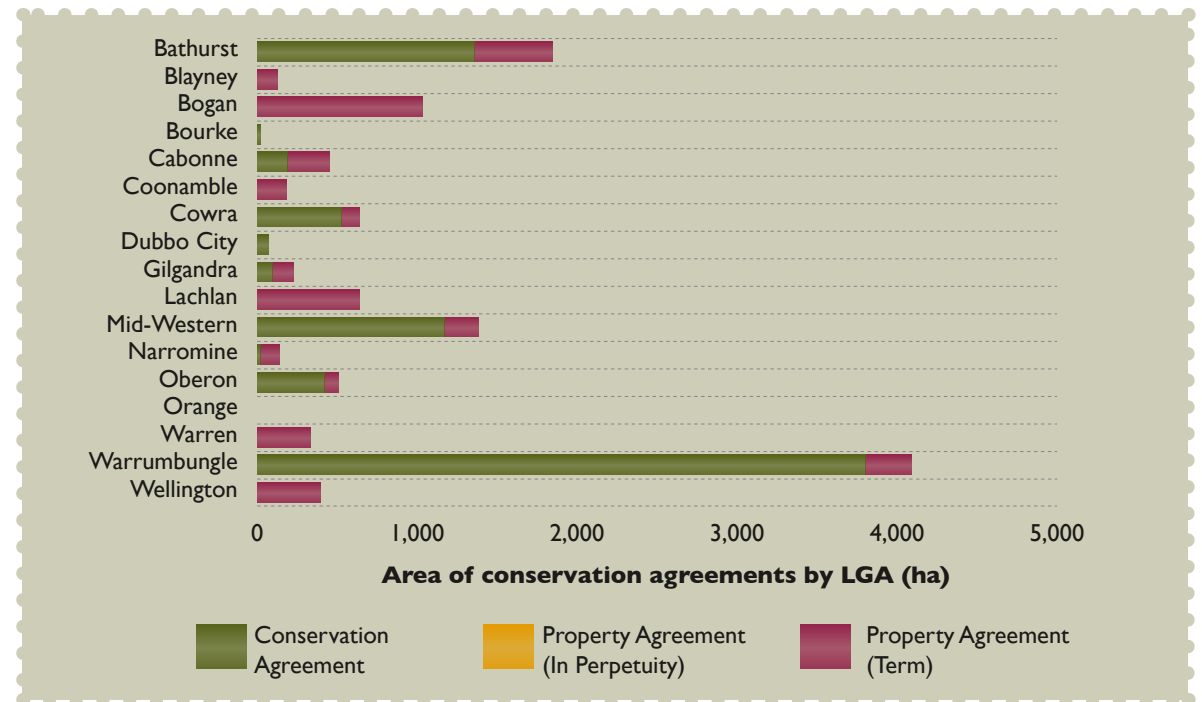
The Conservation Partners Program supports landholders in voluntarily protecting and managing native vegetation, wildlife habitat, geological features, historic heritage and Aboriginal cultural heritage on their properties.

A Conservation Agreement is a joint agreement between landholders and the NSW Minister for the Environment. The agreement provides permanent protection for the special features of land. The area under the agreement is registered on the title of the land, ensuring that, if the land is sold, the agreement and management requirements remain in place.

Property Agreements were established under the *Native Vegetation Conservation Act, 1997* but funding ceased for them in 2004 and they are no longer available. In perpetuity Property Agreements are similar to Conservation Agreements as both are registered on the property title. However, land under a Conservation Agreement cannot be subdivided, whilst land under a Property Agreement can be subdivided. Furthermore, Conservation Agreements provide protection for land with high conservation value, whilst Property Agreements protect native vegetation regardless of its conservation value.

Term Property Agreements provide conservation protection for between 10 and 50 years. Several of these agreements have already expired in the reporting region. Many of the remaining term agreements will expire in the next five years.

Figure 9: Total Area under Voluntary Conservation Agreements by LGA in 2015–16



The area of all Conservation Agreements and Property Agreements is provided as Figure 9. An additional 76.5 hectares of land was protected under Conservation Agreements in 2015–16 with reductions in several LGAs offset by an increase of 1,209 hectares in the Warrumbungle LGA.

Indicator – Extent of Travelling Stock Reserves in LGAs

This the first year the area of travelling stock reserves has been reported.

TSRs are parcels of Crown land reserved under legislation for use by travelling stock. Local Land Services is responsible for the

care, control and maintenance of almost 500,000ha of TSRs in NSW.

TSRs provide pasture reserves for travelling or grazing stock. These reserves can be beneficial in times of drought, bushfire or flood. They are also used for public recreation, apiary sites and many have significant conservation value.

There are 91,292 hectares of TSRs across the region, with at least small areas in every LGA except the Bourke LGA. Approximately 78% of the area though is in the four LGAs of Bogan, Coonamble, Lachlan and Warren, each of which have approximately 15,000–20,000 hectares of TSRs.

Indicator – Proportion of Council reserves that is bushland/remnant vegetation

- The reduction reported in this indicator, as shown in the summary table, comes from changes in three LGAs:
- Bathurst LGA increased its total reserves area by 53.7 hectares whilst leaving their area of bushland/remnant vegetation unchanged.
- Mid-Western LGA reported a small reduction (6ha) in the total area of Council reserves, but a 38 hectare reduction in the area of bushland/remnant vegetation.
- Orange LGA reported a small increase in total reserves (7ha) but a massive 131.6 hectares reduction in their area of bushland/remnant vegetation.

Threatened species

There are numerous threatened species and EECs across the region. Box-Gum Woodland, (also known as Box Gum Grassy Woodland) is one of the most threatened communities in the State with 7% of original extent remaining and is listed on both State and National registers. It was widely found across the region, however the high level of clearing linked to agricultural land use has caused significant decline.

Indicator – State Threatened species listed in Central West and Lachlan Catchments

Figure 10 shows the breakdown of threatened species, EECs and Endangered Populations

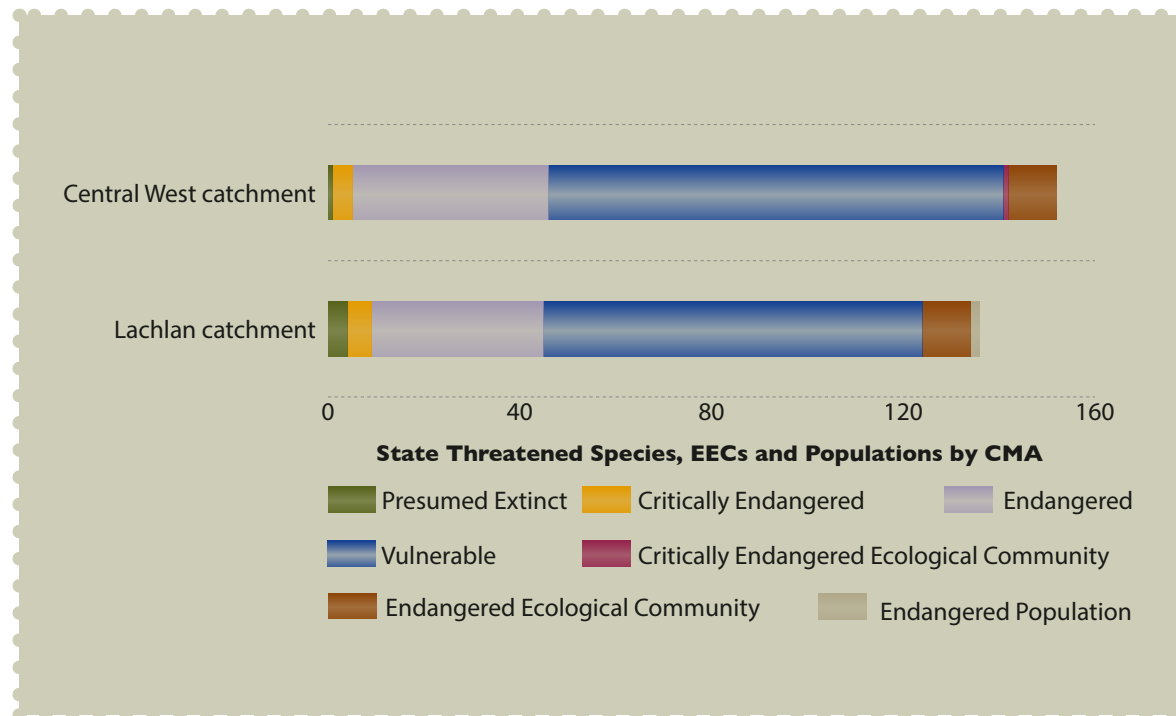


Figure 10: Number of threatened species, EECs and Endangered Populations in the Central West and Lachlan catchments 2015–16

across the former Central West and Lachlan Catchment areas. The number of threatened species listings in the Central West Catchment area increased by three in 2015–16, whilst in the Lachlan Catchment area there was one more. The new listings were:

- Dusky Woodswallow as Vulnerable in the former Central West and Lachlan CMAs
- *Acacia meiantha* and Mountain Trachymene as Endangered in the former Central West CMA

There were 288 species on these lists in 2015-16, the highest level in the past four years.

Threats

There are several threats to biodiversity in the region including land clearing, invasive plants species and feral and pest animals.

The reporting region has undergone extensive clearing since settlement for agricultural purposes. 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.

Weeds are plants whose growth and habit results in the loss of environmental, economic or social values. In the natural environment,

Bluetongue lizard.
(Mark Leary).

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.

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. Other introduced pest animals that have an impact on biodiversity include foxes, cats, dogs and goats

Indicator – Fish restocking activities: non-native species

Restocking with non-native fish (particularly for recreational fishing) is a threatening process for some native aquatic species.

Approximately 340,000 non-native fish (brown and rainbow trout) were restocked across the region in 2015–16 which is the highest total reported in the seven years that this indicator has been tracked. Over 31% of the restocking occurred in the Oberon LGA but it was also notable that there was

non-native fish restocking in the Wellington LGA for the first time.

Indicator – Number of declared noxious weeds

The reporting area has 144 declared noxious weeds (NSW Department of Primary Industries, 2016), and a significant number of environmental weeds present. This is five more than the number in 2014–15 and is the highest level in the eight years of reporting since 2008–09. Noxious weeds declared for the reporting Councils can be found at www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/noxweed.

The overall increase came from:

- the Castlereagh Macquarie County Council area (encompassing the Coonamble, Gilgandra, Warren, Warrumbungle LGAs) which has added 14 weeds to its list
- Cowra Shire Council which has done a major update of its list, increasing the number of weed declarations to 123 from 110 in 2013–14.

Response

Land clearing

In NSW some land clearing can be undertaken under self-assessment codes of the *Native Vegetation Act 2003*. Other land clearing requires a PVP to be agreed with LLS in order for clearing to be approved.



Indicator – New Voluntary Conservation Agreements, Property Vegetation Plans & biobanking

A PVP is a voluntary, legally binding agreement between a landholder and the LLS and may be obtained for a number of reasons, including:

- to obtain clearing approval, and to secure any offsets associated with that clearing.



- to confirm that native vegetation on a property is regrowth, providing a landholder with assurance that they will not need future clearing approval
- to change the regrowth date of native vegetation to an earlier date, provided that landholders can demonstrate a history of rotational farming practices on the land
- to confirm whether existing rotational farming, grazing or cultivation practices meet the definitions of these in the *Native Vegetation Act 2003* so that clearing approval will not be required
- applying for native vegetation incentive funding
- to protect native vegetation for future generations

The Central West LLS reported 25 new contracts for soil and vegetation projects along with 38 Property Vegetation Plans for 2015–16. This is an abnormally high number compared to the previous range reported for this indicator of 2–25 per year for the entire region. In 2014-15, Central Tablelands LLS reported 68 land conservation management agreements not attached to title and seven PVPs for clearing which are attached to title. In 2015-16 it reported no agreements.

Indicator – Roadside vegetation management plans

Roadside vegetation management plans include an assessment of the roadside vegetation, an analysis of conservation value

CASE STUDY: Habitat Enhancement for the Threatened Major Mitchell's Cockatoo (Coonamble LGA)

This project aims to improve habitat in the Coonamble region for the Threatened Major Mitchell's Cockatoo (*Lophochroa leadbeateri*). The Major Mitchell's Cockatoo is named after one of Australia's first inland explorers and remains synonymous with inland Australia.

The Major Mitchell's Cockatoo is an iconic Australian bird, less raucous than its more common cousin the Sulphur Crested Cockatoo, but with a gentler plumage of pink hues that makes it instantly recognisable.

While this project will primarily aim to plant habitat species known to be associated with the Major Mitchell's Cockatoo, either as food sources or roosting trees - and in the long term as habitat trees with hollows - the revegetation works will benefit a whole host of native bird and other fauna species in the region.

Additionally, a key aspect of this project will be a targeted education campaign to assist regional landholders to understand the requirements of the Major Mitchell's Cockatoo and to implement actions to assist the recovery of this iconic Australian outback bird species.

The project is scheduled to go ahead in late September 2016.



and a program of Council maintenance related to the different conservation values.

All seventeen Councils reported that they have a roadside vegetation management plan in place compared with ten last year. The Councils that reported they had completed a plan in 2015–16 are: Dubbo City, Gilgandra, Lachlan, Narromine, Oberon, Warren and Warrumbungle.

Rehabilitation

Rehabilitation and sustainability projects have been developed by organisations to help reduce the impact of land clearing and other threatening processes on biodiversity and to ensure some level of connectivity within the increasingly fragmented landscape.

CASE STUDY: Hollows for Habitat Forum

The plight of hollow dependent fauna is increasing as remnant vegetation is cleared for development. In response to this a Hollows for Habitat Forum was held in Orange in April this year, to draw attention to the situation and to educate Landholders, Local Government, Aboriginal Communities and Landcare groups from around the region in best management practice for the rehabilitation and restoration of hollow dependent fauna. The event was organised by Central Tablelands Local Land Services in partnership with Central West Councils Environment & Waterways Alliance.

The keynote presentation was given by Sean Dooley, editor of Birdlife Australia. Sean has a thorough understanding of the plight of native birdlife and knowledge of much of the great work being done across the country to protect and restore habitat, giving hope for the future.

This talk was followed by an extensive array of expert speakers who discussed diverse topics including:

- Nest box construction, installation and maintenance
- Plant selection and species composition for revegetation projects
- The importance of protecting hollows and mature trees across the landscape
- Management of feral species including hollow users and predatory animals
- Management of hollows through the development application process for Local Government
- Bats, gliders, birds and other hollow dependent species and their requirements.

Other topics included local case studies covered by the Cowra Woodland Birds project, the Glideways program and the work that Orange City Council is achieving with volunteers to provide and monitor nest boxes throughout its natural reserves. Orange City Council also organised and sponsored a Community Spotlighting Walk the evening before the Forum.

A highlight of the day was a demonstration of the hollow augmentation technique by a local arborist. It showed how artificial hollows can be cut into standing trees to provide a more natural and durable hollow in comparison to a nest box.

Key themes to come out of the day included the importance of partnerships and networking for sharing knowledge and resources, the need to link habitat throughout the landscape, the importance of long term monitoring and management, as well as the fact that improving habitat for flagship species has the potential to benefit a range of fauna.

Arborist creating habitat for Microbats in a standing tree (Chris McCulloch)



Indicator – Habitat areas revegetated

Only 74.3 hectares of habitat area was rehabilitated across the entire region in 2015–16, a slight increase over the previous year but still close to the lowest total since this indicator was first reported in 2008–09. Over the past four years, 458 hectares have been revegetated.

Indicator – Vegetation protected and rehabilitated through LLS incentive funding

During 2015–16, the Central Tablelands LLS and the Central West LLS provided incentive funding to protect and rehabilitate 95,645 hectares of vegetation, a huge increase compared with 2014–15. Almost all of this came from Central West LLS which reported an increase from approximately 4,000 hectares of terrestrial vegetation to almost 94,000 hectares.

Indicator – Area of roadside vegetation rehabilitated

This indicator has only been used in the past two years. Four Councils reported that they had rehabilitated a total of 16 hectares of roadside vegetation, considerably less than the 76 hectares reported last year when several Councils received grant funding for work in roadside environments.

Threatened species

In NSW, each listed threatened species, population and ecological community has a priorities action statement (PAS).

The priorities action statement has been used since 2007 to:

- identify strategies to help recover threatened plants and animals
- establish priorities to implement these strategies
- identify actions for all listed species, populations and ecological communities
- identify actions to manage key threatening processes.

The Saving our Species program is implementing priorities action statements by delivering conservation projects.

Indicator – Threatened species actions implemented

The number of threatened species actions implemented across the region in 2015–16 was 14, two less than reported last year. In an encouraging sign, seven Councils reported actions, up from only four two years ago. Examples of actions taken in 2015–16 were:

- Bathurst Regional Council undertook management of road maintenance activities to prevent impacts to the Purple Copper Butterfly and strategic revegetation for the Regent Honeyeater.
- Wellington Council carried out actions for the Golden Acacia along stretches of the Golden Highway and the Burrendong Way.

Native fish

Indicator – Fish restocking activities: native species

A total of 904,972 native fish were restocked across the region in 2015–16 which is the highest total in the nine years that this indicator has been tracked and is almost 350,000 more than the previous highest total.

The main contributor to this large increase in restocking efforts was a release of over 645,000 Murray Cod across twelve of the LGAs, including 415,000 in the Cowra LGA alone.

Invasive species

In 2014, the Natural Resources Commission Weed Review found significant differences in the effectiveness of weed management across NSW. This was largely because of complex processes and duplications in planning, delivery and funding arrangements.

Local Land Services have been charged with supporting weed reforms under the Biosecurity Act. The weed reforms provide an opportunity to deliver better outcomes on a landscape scale and allow operations across organisational and tenancy boundaries.

LLS responsibilities are defined in the Natural Resources Commission Weed Review recommendations as:

- delivering regional strategic weed management plans
- facilitating and coordinating regional strategic weed planning

CASE STUDY: Community Tree Planting Day Benefits Endangered Booroolong Frog (Oberon LGA)

Oberon Council has recently undertaken a project to restore the habitat of the Booroolong Frog by controlling willows along the river bank at Hassall Park, O'Connell. This species is a native stream-dwelling frog, occurring in rocky westerly flowing rivers and streams in highland areas and was once abundant in the Fish River and its tributaries.

The Booroolong Frog lays its eggs in small rock crevices along slow flowing sections of the Fish River. Willow infestations along stream banks in the Oberon region, including the Fish River, and sediment inflows due to land clearing clog these rock crevices which severely interrupts the breeding cycle of the Booroolong Frog. This has led to a dramatic decline of this species in recent decades and it is now listed as endangered under both NSW and Federal legislation.

Following control of willows and other environmental weeds at Hassall Park, one hundred native tube stock including River She Oaks and mid and understory native species have been planted along the riverbank by year 5 and 6 students from the O'Connell Public School.

The students were excited about being involved in this stage of the project as part of their Environmental Education Program. During the community tree planting day held on Wednesday 25 May 2016 students learnt about the importance of restoring the habitat of the Booroolong Frog. Bill Josh from Habitat Connect provided expert instruction and hands on experience to the students about the correct way to plant and care for native tube stock.

The new under-story plantings will help prevent sediment from the car park area of Hassall Park from entering the river. Filling the gaps left by controlling willows along the river bank with native trees will help to shade the aquatic environment and stabilise the river bank to prevent erosion during flood periods.

An additional one hundred native plants will be planted in Hassall Park once further willow control work has been completed.

Oberon Council was delighted to have had the enthusiastic assistance of O'Connell Public School students in this important environmental project.

This project has been funded by a \$9,598 grant from the Central Tablelands Local Land Services' Waterway Values Program and has been kindly assisted by expert advice from the staff of the Central West Councils Environmental and Waterways Alliance.

O'Connell Public School children on the banks of the Fish River.



- assisting with education and community outreach programs

LLS will not take on or replace the role of Local Government or Local Control Authorities in weed management.

The Strategic Plans which will guide the the expenditure of future Weed Action Program funds are well on their way to being finalised, having been prepared by LLS with input from Regional Weed Committees. Membership of the committees include Local Government, Local Control Authorities and other organisations with land tenure. The regional plans will have both strategic and regulatory functions and will be based on the new planning environment for invasive species under the biosecurity legislation, but reflect regional variances - including target species, as they seek to better manage and monitor invasive species at the regional scale.

Indicator – Invasive species (listed noxious or Weeds of National Significance) under active management

There was a 6.2% increase reported this year in the number of invasive species being actively managed by the 17 local Councils across the region, arresting the worsening trend reported for the last few years. This improvement however is almost entirely due to a large increase reported by the former Dubbo City Council which is now actively managing 27 species (compared with 12 reported in the previous two years).



CASE STUDY: Saving Platypus and Fish Habitat in the Bell River (Former Wellington Council and Cabonne Council)

Dubbo Regional Council (former Wellington Council) and Cabonne Council are currently undertaking a project aimed at protecting and improving platypus and fish habitat in the Bell River by removing noxious and environmental weeds from the riparian zone. The Project is primarily focused on the control of willows, a declared noxious weed and weed of National Significance.

The dominance of willow in the River has crowded out a lot of the native plants and reduced habitat for local Platypus and native fish. The Project will include revegetation with indigenous riparian understory species as part of an integrated weed control technique, which will complement the natural regeneration of River She oaks.

The Project Site is situated along Cameron Park in Wellington, an area regularly visited by local residents and visitors to the town. Platypus are regularly seen along this stretch of the River.

The control work will be carried out on thick infestations of willow and other noxious weeds. Once the noxious plants have been treated the Project Site will be planted out with support from the Mid-Macquarie Landcare Group using 100 River Bottle Brush.

This Project is supported DPI – Department of Fisheries, Central West Councils Environment & Waterways Alliance, Central West LLS, Mid-Macquarie Landcare Group, Wellington Fishing Club and the Local Aboriginal Lands Council.



Project Site, Cameron Park Wellington

OPPOSITE: Pink cockatoos perched on an eucalypt tree, Coonamble.



Water and Waterways

Sunrise over the
Narromine wetlands
(Chris McCulloch)

Increasing water consumption and declining water quality are two main issues in the region. The quantity of available water is often variable due to the periodic effects of drought and flood. Many rivers in the Murray-Darling Basin have been dammed to provide a reliable water supply for agriculture and urban use and increasing demand is placing pressure on inland water systems.



The quality of water within the river and groundwater systems is also under threat from industrial, urban and agricultural pollution sources, as well as from treated wastewater and stormwater.

Regional impacts of climate change and variability will include less reliable water supplies in the catchments as a result of higher temperatures, variable rainfall and higher evaporation rates. There are increased risks of more intense storms and flooding between protracted droughts.

Lower flows and higher temperatures may also reduce water quality within the region. For example, low flows, higher temperatures, and elevated nutrients create a more favourable environment for potentially harmful algal blooms. In addition, decreases in runoff due to climate change may reduce the extent and function of freshwater

wetlands that provide habitat for birds and other wildlife including the internationally significant Ramsar-listed Macquarie Marshes.

Water Quality

Condition

Surface water and groundwater quality

Indicator – Average salinity levels in selected streams

Salinity is measured by placing a conductivity probe in a water sample and measuring the flow of electricity between the electrodes.

Salinity is the component of conductivity that is critical to the survival of some aquatic plants and animals. Many aquatic species can



Table 4: Summary Table of Indicator Trends – Water Quality

Issue	Indicator	2012–13	2013–14	2014–15	2015–16	Trend
Surface & Ground Water Quality	Average salinity levels in selected streams (EC)	555	544	386	421	↑
	<i>E.coli</i> remote from wastewater treatment plants	1,020	951	656	685	↑
	Average Total Nitrogen in selected streams (mg/L)		1.1	0.65	2.2	↓
	Average Total Phosphorus in selected streams (mg/L)		0.03	0.03	0.08	↓
	Average Turbidity in selected streams (NTU)		9.3	12	11	↓
Riparian	Riparian vegetation recovery actions (number)	29	26	28	26	↓
	Riparian vegetation recovery area (ha)	151	141	172	198	↑
Industrial/ Agricultural Pollution	Load Based Licencing Volume (kg)	252,088	209,808	209,799	179,273	↑
	Exceedances of license discharge consent recorded	44	20	13	15	↑
	Erosion & Sediment Control complaints received by Council (number)	97	109	55	61	↑
Stormwater Pollution	Number of gross pollutant traps installed	73	72	78	84	↑
	Total catchment area of GPTs (ha)	5,399	5,349	5,509	5,385	↓
	Water pollution complaints (number)	38	44	50	37	↑
Town Water Quality	Number of instances drinking water guidelines not met	274	217	354	291	↓
	Number of drinking water complaints	797	766	821	291	↑

 improvement
  no or little change
  worsening trend

Note – the above trends are for data in 2012–13, 2013–14, 2014–15 and 2015–16 from the same sources. The trend is based on comparing the average of the previous years of reporting with 2015–16. They should be read in terms of the limitations for indicators discussed throughout this chapter. Note also that there are some new indicators for 2015–16 for which no comparison can be made with previous years. Refer to the Appendix for a list of Councils included in the trend data.



survive only within certain salinity ranges so changes in salinity levels result in changes to the variety and types of species found.

Salinity problems occur where deep rooted vegetation is removed from the land and through some farming practices such as flood irrigation. This means that much more water can infiltrate the soil and causes the watertable to rise. This water can move towards the surface, bringing with it large amounts of salt from underground storage. After the water evaporates, high concentrations of salt remain which can eventually find its way into watercourses. Variation in conductivity between regions can also be a result of changes in geology between areas.

Salinity or electrical conductivity (EC) is measured with a meter in micro siemens per centimeter units ($\mu\text{S}/\text{cm}$). The natural conductivity of fresh water varies from very low values (30 EC) to very high values (2,000 EC) which is unsuitable for irrigation. Bore water often has much higher values (10,000 EC) and the conductivity of seawater is around 50,000 EC.

There was a 9% increase in the average salinity level for the three locations which had data available for each of the last four years. This could be due to the drier conditions experienced in 2015–16. Higher salinity levels were reported for the Bogan River at Gongolgon and the Castlereagh at Gungahln, whilst the Cudgegong River downstream of Windamere Dam reported a slightly lower salinity level (-4.6%): the first improvement after a series of worsening readings in each of the previous five years.

Indicator – Average Total Nitrogen in selected streams

Indicator – Average Total Phosphorus in selected streams

Indicator – Average Turbidity in selected streams

Water quality sampling results have been collated from eleven streams or rivers in the region. These results have provided a three year analysis for Total Nitrogen, Total Phosphorus and turbidity.

The presence of normal levels of nitrogen in water usually does not have a direct effect on aquatic insects or fish. However, excess levels of nitrogen in water can create conditions that make it difficult for aquatic insects or fish to survive.

Algae and other plants use nitrates as a source of food. If algae have an unlimited source of nitrates, their growth is unchecked. A waterway that has the milky colour of pea soup is showing the result of high concentrations of algae. Large amounts of algae can cause extreme fluctuations in dissolved oxygen. Photosynthesis by algae and other plants can generate oxygen during the day. However, at night, dissolved oxygen may decrease to very low levels as a result of large numbers of oxygen consuming bacteria feeding on dead or decaying algae and other plants.

Although nitrogen occurs naturally in soil and water, an excess level of nitrogen can be considered to be a contaminant of ground and surface waters. Most sources of excess nitrogen come from human activity, including

agricultural activities such as fertiliser use and stock accessing waterways, waste water discharge, or industrial pollution.

Average Total Nitrogen levels for selected streams in the region increased almost four-fold from last year, possibly due to reduced stream levels related to dry conditions across the region.

Phosphorus is a common constituent of agricultural fertilisers, manure, and organic wastes in sewage, detergents and industrial effluent. It is an essential element for plant life, but when there is too much of it in water, it can speed up eutrophication (a reduction in dissolved oxygen in water bodies caused by an increase of mineral and organic nutrients) of

streams and lakes. Soil erosion is a major contributor of phosphorus to streams. Bank erosion occurring during floods and as a result of physical damage from grazing stock, can transport a lot of phosphorus from the river banks and adjacent land into a stream.

Average Total Phosphorus levels for selected streams in the region almost doubled from last year, possibly due to reduced stream levels related to dry conditions across the region.

Turbidity is the cloudiness of water and is the result of suspended material in the water. This suspended material decreases the ability of light to pass through and this can limit plant growth. This in turn affects the fish and

OPPOSITE: Wetlands,
Warren LGA

Winburndale Dam,
Bathurst.



CASE STUDY: Revive! Rehabilitation of the Belubula River at Pound Flat (Blayney LGA)

Blayney Shire Council has completed willow removal works which are the single largest component of a project to rehabilitate the Belubula River at Pound Flat.

In developing the project budget Council overestimated both the cost of the willow and other woody weed removal, as well as the cost of re-snagging this part of the river to provide in-stream habitat. This being the case Council will allocate the residual funds towards the cost of tub-grinding the removed timber for use as mulch on-site, rather than burning it. This will increase the environmental outcomes of the project by suppressing weed growth.

Interpretive signage will be installed along the adjacent pathway to raise awareness of the project and the harmful effects of willows on local waterways.

The local Landcare group will continue to maintain the site through ongoing weed control, planting and watering. To encourage the broader community to get involved at the site, the regular working bees will be advertised at the site, in the local paper and also on local radio. To date good outcomes have been achieved through Council working with the Landcare group and neighbours.

The next stage of the project, will engage the community in the erection of nest boxes which are being constructed by the local high school. Local schools were also invited to join in tree planting at the site as part of National Tree day in July.

The project has gained the support of DPI Fisheries, which will use it to showcase the benefits of such rehabilitation works to the wider community.

This project has been assisted by the NSW Government through its Environmental Trust.

Belubula River looking downstream of the level crossing at the east of the project area before the project commenced. (28/01/2015) (top picture); looking downstream after project completion. (08/01/2016) (bottom picture).



invertebrate communities which feed on and live in the plants. Turbidity may be caused by silt, microorganisms, plant material and chemicals. Carp are also known to increase turbidity in streams as they actively disturb sediments from the stream bed. However, the most frequent causes of turbidity in rivers and other water bodies are algae and inorganic material from soil erosion.

Certain catchment management practices such as the retention of vegetation along streams, farming practices such as contouring and stubble retention and the effective treatment of effluent from sewage works can reduce turbidity levels.

Turbidity is measured in Nephelometric Turbidity Units (NTU). Normal levels of turbidity can vary from less than 1 in clear pristine streams to very much greater than 200 NTU in murky rivers after flood events.

Average turbidity levels in the region's rivers over the past three years show relatively low turbidity levels of between 9 and 12 NTU.

Indicator – E.coli remote from wastewater treatment plants

Indicator organisms are bacteria whose presence in water gives a simple and meaningful indication that faecal contamination may have occurred. Such organisms are always present in high numbers in the faeces of humans (and other warm blooded animals and birds).

One of the major indicator organisms of faecal pollution is *Escherichia coli* (*E.coli*). When indicator bacteria are detected in water,

their presence indicates that excrement from birds, animals or humans has recently polluted the water and that all types of pathogens (bacteria, viruses, protozoans and parasites) may also be present.

In 2015–16 this indicator was measured at five locations which is an increase from only three locations in earlier years. Whilst the overall trend for the locations reporting each year as shown in the summary table is an improving one, there was a small (4.3%) deterioration this year. A big reduction in *E.coli* measured in Bathurst (continuing a four year improving trend) was more than offset by higher *E.coli* readings in the Dubbo City and Oberon LGAs.

For the second successive year Cabonne LGA recorded a very high reading—its 800 *E.coli* organisms per 100ml was the highest level yet seen across the region in four years of reporting.

Town Water Quality

Indicator – Number of instances drinking water guidelines not met

Incidences of drinking water guidelines not being met in 2015–16 were less than 2014–15 but greater than for the previous two years. There was a large spike in non-compliance for Coonamble LGA and increases also reported in the Cowra and Mid-Western LGAs (see Figure 11). NSW Health committed in 2014–15 to provide funding to upgrade infrastructure for the worsening situation in Bogan LGA which now accounts for almost half of the non-compliance in the entire region.

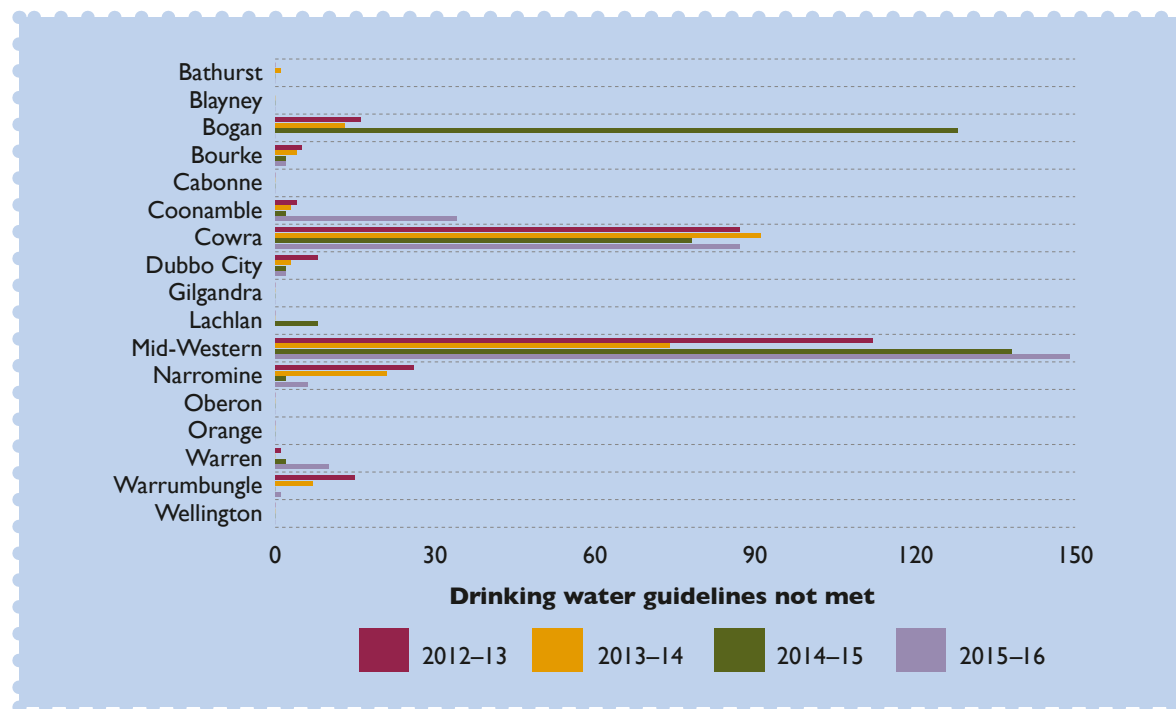


Figure 11: Number of instances in which drinking guidelines have not been met

Indicator – Number of drinking water complaints

The number of drinking water complaints this year was less than half the level in the previous three years, with large improvements reported in the Bathurst, Cowra and Mid-Western LGAs. The significant decrease in Bathurst's complaints came from the commissioning of a manganese removal system at the water filtration plant in August 2015 which has resulted in a marked decrease in the number of discoloured water complaints, rectifying a long-standing problem.

Threats

Industrial/Agricultural Pollution

Indicator – Load Based Licencing volume

The load-based licencing (LBL) scheme sets limits on the pollutant loads emitted by holders of environment protection licences, and links licence fees to pollutant emissions. LBL is a powerful tool for controlling, reducing and preventing air and water pollution in NSW.

The total LBL volume in 2015–16 for wastewater treatment systems was 30,000kg (14.6%) less than in 2014–15 for the twelve



Oberon Common Dam,
Oberon LGA

Councils reporting in each of the last four years. Bathurst and Oberon were the only LGAs to report significant increases which were more than offset by the reductions in the Dubbo City, Mid-Western, Orange and Warren LGAs. The 23,000 kg reduction in Warren LGA was probably a one-time anomaly as it reported a high total in 2014–15 after not lodging returns for a number of years.

Indicator – Exceedances of license discharge consent recorded

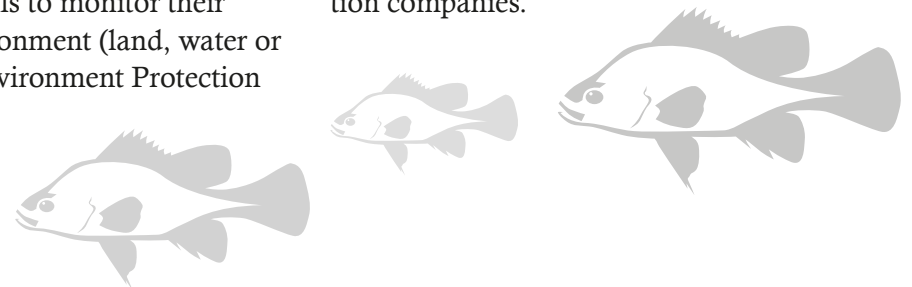
In 2011, the New South Wales Government passed legislation (*The Protection of the Environment Legislation Amendment Act 2011*) which requires Councils to monitor their discharges to the environment (land, water or air) as part of their Environment Protection License conditions.

The number of incidents of license discharges exceeding the allowed amount fell slightly again in 2015–16, to the lowest level since reporting commenced. Cowra LGA reduced its exceedances from 28 in 2011–12 down to only one in 2015–16.

Indicator – Erosion & Sediment Control complaints received by Council

One measure of the threat to waterways from sediment pollution is the number of erosion and sediment control complaints received by the local Councils. The complaints can range from sediment spilling out of construction sites to obvious plumes of sediment flowing into streams.

The total number of Erosion & Sediment control complaints across the region rose by 11% to 61 in 2015–16 for the fifteen Councils reporting in each of the last four years. The overall trend is improving because this total is much lower than the number reported from 2012–13 to 2013–14 with Bathurst and Cabonne LGAs in particular showing far fewer complaints. In the case of Bathurst LGA, the reduction is due to ongoing focus by Environmental Compliance Officers and training of Council staff, local builders and construction companies.



Indicator – Water pollution complaints

In 2015–16, Bathurst and Dubbo City Councils received all but five of the 37 water pollution complaints in the region. Mid-Western and Bogan were the only two other Councils to receive any complaints. This figure is lower than the previous two years and comparable with the level in 2012–13.

Response

Riparian rehabilitation

The restoration of riparian (river bank) zones is being carried out across streams throughout Australia, costing millions of dollars annually. These efforts are motivated by an understanding that the overall health of our streams is closely linked with condition of the riparian zone.

Indicator – Riparian vegetation recovery actions

Indicator – Riparian vegetation recovery area

Whilst the number of riparian vegetation recovery actions was almost unchanged over the past four years, there was a significant increase in the total recovery area across the region from the past three years. In 2015–16, Cabonne and Warren LGAs both reported a sizeable increase in the area of their riparian vegetation recovery projects. In Warren LGA, the recovery area was extended by 15 hectares, from just the bottom weir reserve to include the river corridor running from the top to bottom weir.



Stormwater pollution

Litter enters waterways through stormwater and can negatively impact upon water quality and aquatic fauna. Installation of GPTs is a Council response to litter impacts. These devices trap larger pollutants such as litter and coarser sediments in stormwater drains and outlets, but they do not trap smaller particles or heavy metals. While there are ongoing costs associated with maintenance and cleaning of these traps, there are significant benefits to aquatic ecosystems and the visual appearance of waterways.

Indicator – Total catchment area of GPTs

The 2015–16 changes to number and area of GPTs for the region are almost entirely due to a new reporting method by Dubbo City Council. The former Dubbo City Council in this reporting period chose to only include the developed catchment, whereas in previous years the total catchment draining to a GPT. This method is helping Council to gain better figures on litter generated per hectare, as well as informing cleaning costs and cleaning frequency for each catchment.

Bridge over the
Bogan River, Nyngan
(Chris McCulloch)

Table 5: Summary Table of Indicator Trends – Water Quantity

Issue	Indicator	2012–13	2013–14	2014–15	2015–16	Trend
Dam Levels	Average dam levels	76.0%	55.0%	41.3%	39.6%	↓
Water extraction	Number of Water Supply Work Approvals from surface water sources		2,958	2,950	2,748	↑
	Volume of surface water permissible for extraction under licences (GL)		1,007	1,063	1,033	↑
	Number of Water Supply Work Approvals from groundwater resources	19,292	17,385	17,547	17,457	↑
	Volume of groundwater permissible for extraction under licences (GL)	298	268	285	270	↑
	Actual volume extracted through groundwater licences (GL)			92	94	↓
Council water consumption	Area of irrigated Council managed parks, sportsgrounds, public open space (ha)	928	922	961	1,079	↓
	Water used by council for irrigation (including treated and untreated) (ML)	2,014	1,908	1,978	1,919	↑
Town water consumption	Annual metered supply (ML)	27,397	27,618	25,676	27,526	↓
	Annual consumption (Total from WTP) (ML)	29,519	29,053	28,963	30,838	↓
	Average annual household mains potable water usage (kL/household)	265.6	260.2	235.9	251.3	↑
	Average level of water restrictions implemented	0.2	0.8	0.7	0.7	↓
	Water conservation programs (number)	9	11	14	14	↑

- ↑ improvement
- no or little change
- ↓ worsening trend

Note – the above trends are for data in 2012–13, 2013–14, 2014–15 and 2015–16 from the same sources.

The trend is based on comparing the average of the previous years of reporting with 2015–16.

They should be read in terms of the limitations for indicators discussed throughout this chapter.

Note also that there are some new indicators for 2015–16 for which no comparison can be made with previous years. Refer to the Appendix for a list of Councils included in the trend data.

Water Quantity

Condition

Indicator – Dam levels

Dam storage levels indicate both recent rainfall and the pressures that water consumption place on water storages. Six dams in the region—Carcoar, Wyangala, Lake Cargelligo, Windamere, Oberon Dam and Burrendong—were used to indicate dam levels.

In the past year there has been a small decline in the average storage volume for all major dams in the region, following on from larger declines in the two previous years. As shown in Figure 12, in 2015–16 Carcoar, Wyangala, Lake Cargelligo and Burrendong dams all fell to their lowest average levels since 2009–10, whilst Oberon and Windamere dams were at their lowest levels since 2010–11, reflecting dry conditions experienced across the region.

Threat

Surface and Groundwater Extraction

Irrigation places significant pressure on water resources. Historically over-allocation of water licences has seen additional stress placed on aquatic habitats such as the Macquarie Marshes despite the requirement for environmental flows. The demand for groundwater extraction, particularly for irrigation, is increasing in the long-term and placing additional pressure on aquifers and ecosystems.



Bogan River, Nyngan
Bogan LGA.

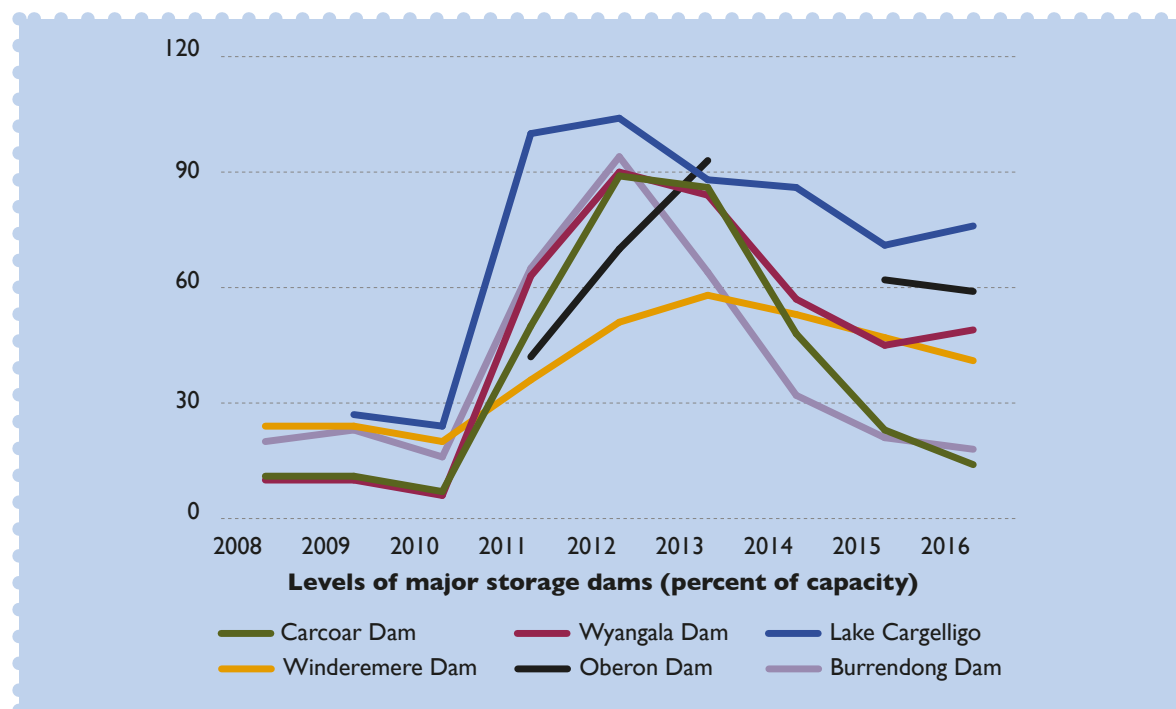


Figure 12: Levels of
major storage dams in
the region

CASE STUDY: Native fish restocking program (Bourke LGA)

Bourke Shire Council partnered with the local fishing club and obtained funding through the ‘dollar for dollar’ native fish restocking program.

The aim of the program is to enhance recreational freshwater fishing opportunities by supporting local communities to stock native fish species and to increase community and industry involvement in, and awareness of, responsible stocking.

The restocking program is helping to promote the values of sustainable fishing by providing a sense of community ownership and responsibility for our native freshwater fisheries. Fish stocking can provide many benefits such as creating new fisheries or augmenting existing ones, and is recognised for its importance to the community in terms of quality recreational fishing, conservation outcomes, employment and subsequent economic benefits that grow in response to the activity.

Through the joint program 30,303 Golden Perch fingerlings were released into targeted areas of the Darling River within the Bourke LGA.



Releasing native fish fingerlings

Indicator – Number of Water Supply Work Approvals from surface water sources

The right to extract irrigation water from surface water sources is regulated under the *Water Management Act 2000*. Under this Act, every pump used to extract water has to have a “Water Supply Work Approval”. The number of Water Supply Work Approvals across the region this year was almost seven percent less than in the previous two years.

Indicator – Volume of surface water permissible for extraction under licences

Under the *Water Management Act 2000*, irrigators require an “Access Licence” to extract water from surface water sources governed by a water sharing plan, via one or more pumps (Water Supply Work Approvals). The Access Licences are volumetric entitlements and can be bought and sold with or separately to the land with which they were originally associated. NSW policy has been to cap the volume of water available for extraction from surface water sources by not increasing the total volume issued under Access Licences. It is expected that this may lead to an overall decrease in this indicator over time, and indeed a 2.8% decrease has been reported for 2015–16. However, this year’s figure is still higher than that reported in 2013–14 so there is no clear sign of an actual declining trend yet.

Indicator – Actual volume extracted through surface water licences

The recorded volume of water extracted in 2015–16 across the region through surface water licences was 176.6 gigalitres, which is 17% of the total licensed volume.

Indicator – Number of Water Supply Work Approvals from groundwater resources

As with surface water, every bore used to extract water has to have a “Water Supply Work Approval”. The number of these approvals has decreased by 0.5% in 2015–16 compared with 2014–15. It is hard to draw conclusions on the underlying trend as data has only been provided on the current basis for three years and there are some inconsistencies in the data. However, the number of groundwater approvals which have an Access Licence (volume) linked has increased slightly in each of the last two years. These approvals are likely intended for irrigation use.

Indicator – Volume of groundwater permissible for extraction under licences

The 2015–16 volume of groundwater permissible for extraction is similar to that for 2013–14 and less than that for 2012–13 and 2014–15. It is possible that the fluctuations in this indicator may be due to trading of access licences into and out of the region.

CASE STUDY: Environment and Waterways Alliance (Central West Councils)

The Central West Councils Environment & Waterways Alliance (the Alliance) is a partnership of 18 Councils across the Central West of NSW, supported by Central Tablelands and Central West Local Land Services, working towards improving the natural and built environment of our region.

The member Councils in the Alliance are: Bathurst, Blayney, Bogan, Cabonne, Coonamble, Cowra, Forbes, Gilgandra, Lachlan, Lithgow, Mid-Western, Narromine, Oberon, Orange, Parkes, Warren, Warrumbungle, and Dubbo Regional Council (former Dubbo City and Wellington Councils).

The role of the Alliance is to support its member Councils across the region through the provision of training, hosting conferences and guest speakers, incentive funding to carry out on-ground works and other capacity-building events.

In 2015 the Alliance, previously known as the Salinity & Water Quality Alliance, reviewed its 5 Year Plan and decided on a new name - the Environment & Waterways Alliance - to better reflect the nature of the activities identified in the Plan. Also at this time the Alliance developed its own website: www.cwcewa.com.au

To celebrate these significant achievements the Alliance hosted an event to promote the important resources to the member Councils of the Alliance. Minister for Local Government, the Hon. Paul Toole launched the website and 5 Year Plan stating that: “The Alliance is a great example of Councils across the Central West of NSW working together and supporting each other to improve the environmental outcomes of our region. It is a credit to all involved that this organisation of 18 Councils continues to grow and develop to meet the changing needs of its members.”

LEFT TO RIGHT: Mick Callan, Alliance Project Support Officer; Hon. Paul Toole, Minister for Local Government; Cr. Reg Kidd, Central Tablelands Local Land Services Board Member; Jane Chrystal, Central West Local Land Services Manager Strategic Services and Murray Wood, Chair of the Alliance.



Figure 13: Annual town water consumption

Indicator – Actual volume extracted through groundwater licences

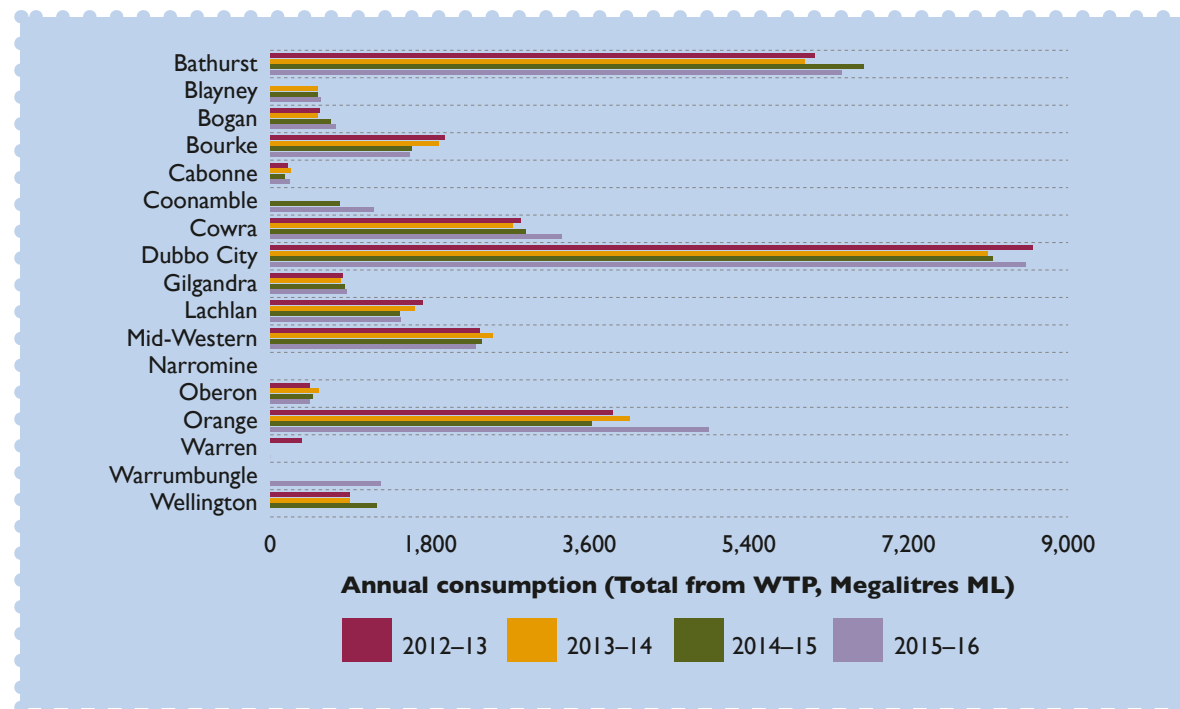
The actual volume of water recorded as extracted through groundwater licences across the reporting region in 2015–16 was 94.1 gigalitres. This is 34.9% of the volume permissible for extraction under existing licences: an increase from 32% reported last year. It should be noted that this percentage is likely to be higher as many bores are still unmetered.

Town Water Consumption

Reticulated water consumption is relatively small in comparison to that used for irrigation. In the region it accounts for about four per cent of water consumption compared with 88% used for irrigation and eight per cent for stock and domestic use (Murray Darling Basin Committee, 2007). Nevertheless, with many towns and regional centres growing, there are increasing pressures on water used for town water supplies.

Indicator – Annual metered supply

Metered supply is directly related to rainfall. Metered supply rose by 7.2% in 2015–16 compared to 2014–15 for the eleven Councils that have reported this data in each of the last four years. The 2015–16 level is comparable to that for 2012–13 and 2013–14. Very dry conditions for much of the reporting period account for these changes.



Indicator – Annual consumption (Total from WTP)

Total water consumption rose by 6.5% compared to the previous year for the eleven Councils that have reported this data in each of the last four years. As shown in Figure 13, water consumption had been relatively unchanged for the three previous years and remains high compared to the preceding wetter years.



Indicator – Average annual household mains potable water usage

Household water consumption rose by 6.5% in the reporting year compared with 2014–15, with nine of the eleven Councils that have reported this data in each of the last four years reporting an increase. There was a return to dry conditions in summer and autumn 2015–16, which accounts for this increase. However, average household consumption is still lower than in the 2012–2014 period and therefore is shown in the summary table as an improving trend.

Council Water Consumption

Due to the large number of services they provide, local Councils may be large users of water in comparison to businesses and households. Their efficient use of water is therefore critical to overall water consumption as well as their important role in educating and leading the community in water use minimisation.

Indicator – Area of irrigated council managed parks, sportsgrounds, public open space

Almost all of the 12.3% increase from 2014–15 in the total irrigated area came from the Orange and Wellington LGAs. Prior to this year, the levels were relatively constant across the region. For Orange LGA, this increase in 2015–16 was a one-off adjustment from improved data quality (previous years had omitted public open spaces).

Indicator – Water used by council for irrigation (treated and untreated)

Three percent less water was used for irrigation in 2015–16 compared to the previous year by the fourteen Councils that have reported on this indicator in each of the last four years. Cabonne Council's usage reverted to more normal levels (3.9 megalitres) after a large increase to 110 megalitres last year. Dubbo City's consumption rose by about 40 megalitres this year, with the area irrigated increasing by 8 hectares. This could be related

CASE STUDY: Willow Tree and Bamboo Removal Program (Warren LGA)

The project commenced on the 18 February 2016 and was aimed at removing sapling willow trees from the river corridor from Warren's top weir to bottom weir. The project also targeted bamboo shooters that had started to form large islands in the centre of the river.

The sapling trees were removed by cutting the tree as close to ground level as possible, then the stump was painted with straight bio-active roundup to kill the stump not allowing for the tree to regenerate.

For willow tree branches that were cut, best practice is to place the branches out of the water onto the bank as cut branches have the ability to re-shoot if left in the river water and re-establish.

Phase two of the program commenced on the 21 March 2016 and involved direct drilling the trunks and stems of mature well established willows with straight bio-active round up.

Using a cordless drill holes were drilled into the trunk and stems of the trees and the bio-active round up was applied. This method is ideal for the larger trees as cutting down the larger willows would cause the trees to block the flow of the river and also create a safety issue to the chainsaw operator as the majority of the larger trees are located on steep banks with very little room to manoeuvre to avoid falling tree limbs.

On the 23 March 2016, spraying of the regrowth from the cut and painted willows commenced to ensure the trees did not regenerate this was done with diluted bio-active roundup, stumps and any green off cuts were sprayed.

A second dose of diluted bio-active round up was also applied to the bamboo shooter islands which had died back greatly from the dose from the prior month. The colour of the bamboo had gone from a lush green to a straw yellow and had started to rot and break down.



Mature Willow Tree directly drilled,
located at Warren Town Bridge

OPPOSITE: Wetlands,
Cabonne LGA.

to the drier climate in this area, and the fact that Dubbo City maintains a large area of parks, gardens and sporting fields.

Response

Murray-Darling Basin Plan

As noted previously in this report, the Murray-Darling Basin Plan commenced in 2012 to guide governments, regional authorities and communities to sustainably manage and use the waters of the Basin.

The overarching aim of the plan is to strike a balance between access to water for Basin communities and provision of adequate water for the environment. The Plan will be reviewed and revised throughout a seven year implementation phase.

Town Water Consumption

Indicator – Level of water restrictions implemented

There was little change in the average water restrictions level across the region this year. However, Lachlan Shire Council went back to only Level 1 water restrictions after two years on Level 3 and 4, whilst Warrumbungle Shire Council went in the opposite direction, increasing to Level 3 restrictions from Level 1.

Indicator – Number of water conservation programs

Fourteen different current water conservation programs were reported in 2015–16 between the Bathurst, Bourke, Cabonne, Dubbo City and Orange Councils. Programs included rainwater tank rebates in the Bourke LGA and distribution of free frost covers for water meters in Dubbo City Council LGA.

Programs reported over the past three years include:

- Free shower timers for residents in Dubbo City LGA
- Water Wise education campaigns in Lachlan, Dubbo City and Bathurst LGAs.

Moisture glistening on
the wings of a dragonfly
at dawn



CASE STUDY: Stormwater 2015 – Stormwater Best Management Practice Conference

Council staff and consultants from across the Central West of NSW attended the inaugural regional Stormwater Best Management Practice Conference held in Dubbo in September 2015. The event was hosted by the Orana and Central West branches of the Institute of Public Works Engineering Australasia (IPWEA) in partnership with the Central West Councils Environment & Waterways Alliance, with the support of Central Tablelands and Central West Local Land Services.

Caltex Park was the venue for the conference which was kindly provided by the former Dubbo City Council. While providing a great facility for an event of this type, the Caltex Park venue is an example of a facility that captures and treats stormwater for reuse through irrigation on the world class playing surface.

This stormwater reuse project was one of five local stormwater best management practice case studies presented in the morning session. This session demonstrated the high calibre of projects being undertaken within the region, proving that significant and industry leading projects are not just the domain of major city councils and developers.

Staff from Blacktown City Council provided conference attendees with an understanding of the Water Sensitive Urban Design Capacity Building Program in place at Blacktown and how this could translate to smaller, regional councils. This presentation was followed by the Co-President of Stormwater NSW, who discussed how Stormwater NSW could better work with regional councils to achieve best management practice stormwater management.

Staff from Central Tablelands Local Land Services provided an introduction to Water Sensitive Urban Design which led into an interactive workshop, facilitated by the Director of Storm Consulting. This workshop provided participants with an opportunity to understand the impacts of urbanisation, appreciate the benefits of stormwater management and to consider alternative techniques.

To conclude the day, a site visit to nearby Keswick Estate allowed participants to understand the unique challenges faced at this development site, including managing stormwater flows while protecting remnant Endangered Ecological Community Fuzzy Box Woodland.

The Conference was extremely well received by the attendees, who were supportive of holding a similar event in the future.





People and Communities

This chapter reports on environmental issues relating to people and communities including Indigenous and non-indigenous cultural heritage, community engagement in environmental matters and air quality.

Councils are responsible for urban planning, infrastructure, some aspects of environmental and heritage protection and restoration, protection and conservation of resources, provision of community facilities, and community services.

Cultural heritage incorporates both Indigenous and non-Indigenous heritage and both may be threatened by increased development and a lack of management and awareness.

Community volunteering is important to the implementation of environmental actions in many Council areas. Volunteers can be bought together for specific projects or can be drawn from existing community groups including Landcare, Greening Australia and other local environment groups.

Air pollution can be harmful to our health. Air pollution can contain a mixture of solid particles, liquid droplets and gases from a variety of sources such as industry, motor vehicles, heating appliances, and tobacco smoke.

Park irrigation,
Bathurst.



Table 6: Summary Table of Indicator Trends – People and Communities

Issue	Indicator	2012–13	2013–14	2014–15	2015–16	Trend
Active community involvement	Environmental volunteers working on public open space (hrs)	16,072	15,492	12,173	13,551	↓
	Number of environmental community engagement programs	70	82	104	115	↑
	Number of growers markets/local food retailers specialising in local food	72	97	131	139	↑
Community Impacts	Number of days that air pollution maximum goals for particulate matter were exceeded	2	2	1	1	↑
Aboriginal Heritage	Number of Indigenous sites on AHIMS register		9,767	10,579	10,850	↑
	Inclusion in DCPs & rural strategies (number of Councils which include)	13	13	13	16	↑
	Extent of liaison with Indigenous communities (self-assessed from 0 = none to 3 = High)	1.8	1.6	1.6	1.6	→
	Development approvals on listed Indigenous sites (number)	13	5	15	14	↓
	Number of Indigenous heritage management actions/responses	6	10	4	2	↓
Non-Aboriginal Heritage	NSW Heritage Items (number)	112	110	109	112	→
	Locally listed heritage items (number)	2,324	2,402	2,669	2,658	↑
	Actions to protect non-Indigenous heritage (including management plans) (number)	32	32	40	34	→
	Heritage buildings on statutory heritage lists demolished/degraded in past year (number)	2	3	3	2	↑
	Heritage buildings on statutory heritage lists renovated/improved in past year (number)	91	117	86	72	↓

- ↑ improvement
- no or little change
- ↓ worsening trend

Note – the above trends are for data in 2012–13, 2013–14, 2014–15 and 2015–16 from the same sources. The trend is based on comparing the average of the previous years of reporting with 2015–16. They should be read in terms of the limitations for indicators discussed throughout this chapter. Note also that there are some new indicators for 2015–16 for which no comparison can be made with previous years. Refer to the Appendix for a list of Councils included in the trend data.

Condition

Air

Much of the State-level air quality monitoring is confined to the Greater Metropolitan area which includes Sydney, Wollongong and Newcastle. OEH monitors one site in the reporting region, Bathurst; however, ozone and particulates are the only air pollutants measured at this site. Particulates can include soil particles, dust, smoke, plant spores, bacteria and salt. Particulate matter may be a primary pollutant, such as smoke particles, or a secondary pollutant formed from the chemical reaction of gaseous pollutants.

Human activities resulting in particulate matter in the air include mining; burning of fossil fuels; transportation; agricultural and hazard reduction burning; the use of incinerators; and the use of solid fuel for cooking and heating.

Particulate matter can be usefully classified by size. Large particles usually settle out of the air quickly while smaller particles may remain suspended for days or months. Rainfall is an important mechanism for removing particles from the air.

The size of a particle also determines its potential impact on human health. Larger particles are usually trapped in the nose and throat and swallowed. Smaller particles may reach the lungs and cause irritation there. Fine particles can be carried deep into the



lungs and irritate the airways. When exposed to particulate pollution, people suffering from heart disease may experience symptoms such as chest pain, and shortness of breath.

Indicator – Air pollution maximum goals for particulate matter exceeded

This year there was only one day (in November 2015) on which particulate matter (PM10) recorded at the Bathurst testing station exceeded the air pollution maximum goals. This low level was the same in 2014–15, with two exceedences recorded in both 2013–14 and 2012–13.

A positive development this year was that in May 2016 the Bathurst testing station also started reporting on PM2.5 exceedences. There is a growing body of evidence which points to fine particles as being more dangerous to human health, particularly their contribution to cardiovascular disease.

Indigenous heritage

The land has great significance to Indigenous people for the role it plays in social and political relations and the cultural construction and transmission of knowledge, as well as spiritual values.

Indicator – Number of Indigenous sites on AHIMS register

In 2015–16, there were 10,850 sites across the region listed on the Aboriginal Heritage Information Management System (AHIMS) register. This continues a rise from 2013–14.

As shown in Figure 14, there were 271 sites added since last year, with 140 of these in the Mid-Western LGA (which has almost 40% of the sites for the region) and at least one site added in every other LGA.

Non-Indigenous heritage

Indicator – NSW Heritage Inventory items

There was a small increase in the number of items listed under the *NSW Heritage Act 1977*, with one more site in each of the Blayney, Cabonne and Wellington LGAs. However, the number of heritage items listed throughout the region has remained relatively constant over the past four years.

Indicator – Locally listed heritage items

With the process of updating and finalising new LEPs now largely complete, it appears there is now a period of only occasional small changes in the numbers of listed heritage items. This year, there were no new items added in any of the 17 LGAs. The only changes were the removal of five listed items in Blayney LGA and six in the Warrumbungle LGA.

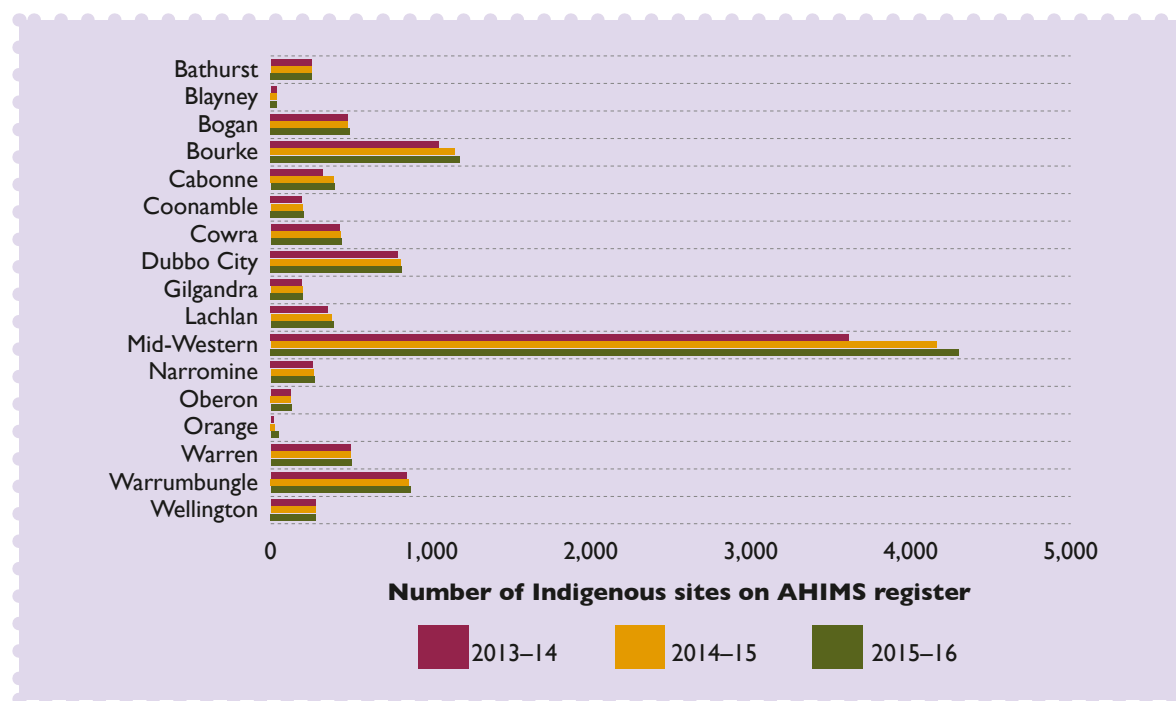


Figure 14: Number of Indigenous sites on the AHIMS register

Threats

Development

Indicator – Development on listed Indigenous sites

Fourteen developments on listed Indigenous sites were reported in 2015–16, across the former Dubbo City and Mid-Western LGAs. This was slightly less than last year's figure, although greater than the levels reported in 2012–13 (13 developments) and 2013–14 (5 developments).

Whilst the number of developments per year is small it should be remembered that

these heritage sites are finite and any development which degrades them is potentially permanently deteriorating the Indigenous heritage in the region.

Indicator – Heritage buildings on statutory heritage lists demolished / degraded in past year

Two listed heritage buildings were degraded in the region during 2015–16. Bogan Shire Council sought emergency funding from the NSW Government for works on the state-listed Chinese Burner. The levels for this indicator have remained relatively constant over the past four years.

CASE STUDY: Green Army—Protecting, restoring and connecting Bathurst Woodlands—a collaborative approach (Bathurst LGA)

Bathurst Regional Council partnered with seven other groups and government agencies to apply for Green Army teams in Round 3 of the Commonwealth Green Army Program, with Council acting as the sponsor and lead organisation for the projects.

Council was awarded four sequential six-month projects with Campbell Page-Skillset appointed as the Service Provider. The first project commenced in July 2015 with a Green Army team of nine participants and a team supervisor. Each six month project involves a new Green Army Team and the final Round 3 project will be completed in June 2017.

The aim of the overall project is to protect and improve the habitat quality of remnant native vegetation in the Bathurst LGA and to improve the connectivity between remnant vegetation areas. A number of the sites involved in the project contain remnant Box Gum Grassy Woodland, a state and nationally listed endangered ecological community (EEC). Actions undertaken at these sites are helping to protect this EEC.

The project partners are:

- Peel Flora and Fauna Reserve Trust
- Wattle Flat Heritage Lands Trust
- National Parks
- TAFE
- Skillset
- Forestry Corporation
- Bathurst Local Aboriginal Land Council

While some of these groups have previously worked collaboratively, this project is unique in the way it brings nature conservation groups, educational institutions, State Government Agencies, the Bathurst Local Aboriginal Land Council and Bathurst Regional Council together to protect native vegetation across a range of land tenures. A lot of knowledge and expertise relating to native vegetation, biodiversity and restoration techniques resides in the various partners participating in the project and it is facilitating learning and sharing amongst the various partners, the Green Army participants and local communities.

Over the four projects, work is being undertaken at more than 20 sites across the LGA. Activities at these sites have included site assessments, targeted weed control, fence and rubbish removal, planting of local native vegetation, walking track maintenance and erosion control.

The project contributes to the achievement of some of the strategies and recommended actions of the Bathurst Biodiversity Management Plan and Urban Waterways Management Plan.

Bathurst is not the only local government area in the reporting region that has been involved in the Green Army Program. In 2015, Mid-Western Regional Council ran a six month Green Army Project entitled “Enhancing Urban Biodiversity”. The project involved weed control, tree planting, flora/fauna assessments, erosion control works, threatened species monitoring, seed collection/propagation, and water quality monitoring throughout five sites located within urban areas of the LGA. The project helped to promote awareness of the importance of biodiversity within an urban environment and encourage involvement with volunteer groups. The team planted over 15,000 trees, managed 30 hectares of weeds, collected 2kg of seed and helped to combat erosion on 2km of riverbank and along pathways.

Other Green Army Projects have been run by Blayney Shire Council, Orange City Council, Cowra Shire Council and Lithgow City Council.

Winburndale Nature Reserve Markwicks Tree Planting (Steve Woodhall)





Response

Environmental Volunteerism

Indicator – Environmental volunteers working on public open space

The 13,551 person hours logged by environmental volunteers working on public open space across the region was over 11% more than in 2014–15 for the 14 Councils that reported this indicator in each of the last four years. However, it was significantly less than the levels for 2012–13 and 2013–14.

In 2015–16, approximately 48% of the total hours were recorded in the Dubbo City LGA where activities included: Clean Up Australia Day, National Tree Day, World Clean Up Day, Bushcare and Landcare activities and working bees and individual working bees.

In Gilgandra LGA, students from the Shellharbour Anglican College returned again this year, contributing to their highest volunteer hours in the eight years this indicator has been tracked. The students participated in the rehabilitation (seeding) of the four closed rural waste facilities. They also participated in a litter pick and assisted in cleaning the local cemetery.

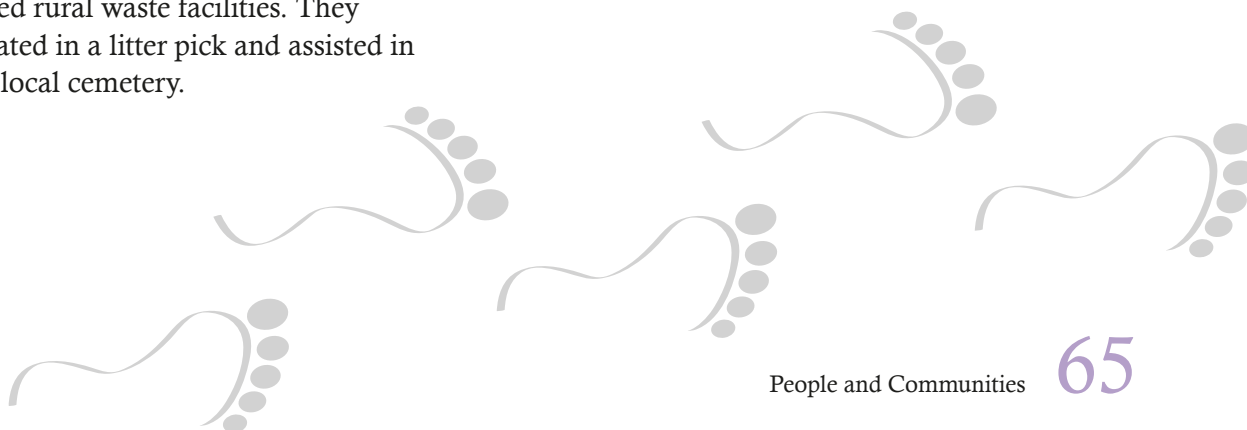
Indicator – Number of environmental community engagement programs

The number of environmental community engagement programs across the 15 Councils reporting in each of the last four years rose by over 10% in 2015–16. The most encouraging change is that 14 of the 17 Councils in the region ran programs this year, compared to only eight two years ago.

Local food outlets

Indicator – Number of growers' markets/local food retailers specialising in local food operating within LGA

Eleven of the 17 Councils in the region reported that they had growers' markets and/or local food retailers specialising in local food. Notably, 65% continue to be in the Cabonne and Orange LGAs. However, the growth in numbers this year mostly came from Bourke and Warrumbungle LGAs with the latter reporting two local markets and four independent supermarkets selling local produce (up from only one previously).



CASE STUDY: Inspiring Environmental Awareness (Cowra LGA)

Cowra Shire Council's Small Environmental Projects Fund is a program aimed at schools, community groups and organisations to encourage environmental awareness within the local environment. This project is run by Council's Natural Resources Management Committee.

Proposals are selected from the community that support environmental health and practices through sustainability, rehabilitation, education and restoration.

The program commenced in 2014 and has assisted the community to develop gardens and restore natural environments. In 2015–16, Council assisted eight projects which were funded to a total of \$9,000. Council encourages the successful applicants to source all materials and labour locally and to use native plants endemic to the local area.

Some past projects that received funding are:

- St Raphael's Catholic School – Involved the irrigation and planting of native grasses along a terraced bank in the school yard. This softened and stabilised an unused area within the school grounds.
- Mid Lachlan Landcare – Developed and installed an interpretive sign at Belleview Hill Reserve, 'Conserving Grassy Woodlands'. The sign provides information about grassy woodland ecosystems and the natural features within the Reserve, while raising awareness of threatened species.
- Darby's Falls Progress Association – Local volunteers restored three run-down gardens within the village of Darby's Falls. Working bees involved cleaning out the existing beds and the planting of native plants and mulching.
- Cowra Early Childhood Centre – Purchased raised garden beds and created an edible garden. The children assisted with filling the beds with soil and planting a mix of herbs and vegetables and continue to take a hands-on approach in caring for the gardens and learning about sustainable living.
- Rotary Club of Cowra – Enhanced the riparian zone of Waugoola Creek at Europa Park by removing weeds and planting native trees and understory. The project has helped to stabilise the creek bank and provides habitat and a corridor for wildlife.
- Cowra Public School – Created an avenue of trees and bushes along the northern boundary of the school and a native garden around the school canteen. The trees and garden will help to provide shade and screening from the adjoining road, buildings and public carpark.
- Cowra Lady Golfers – A team of volunteers planted mixed varieties of Bottlebrush and Gums around the Cowra Golf Course to replace dead trees and barren spaces, adding to the presentation and natural environment of the site.
- Cowra Early Childhood Centre – Created a nature playground with native shrubbery and grasses, logs to walk along, rocks to climb on and a dry riverbed. The play area is now an inviting, safe and sustainable natural environment for all children and families to enjoy
- St Raphael's Catholic School – Constructed a productive food garden by acquiring old water tanks and converting them into vegetable plots. Students are learning through real-life experiences about planting, nurturing and harvesting seasonal produce.



Nature Playground created by Cowra Early Childhood Centre funded by Cowra Council's 2015 Small Environmental Projects scheme

Indigenous heritage

Indicator – Indigenous heritage inclusion in DCPs & rural strategies

In 2015–16, 16 Councils reported that they have a specific Indigenous heritage management plan/strategy in place, including five that reported for the first time they had a plan or strategy (Bogan, Cabonne, Oberon, Warren and Warrumbungle Councils).

Indicator – Extent of liaison with Indigenous communities

Councils were asked to self-rate the extent of their liaison with Indigenous communities. Over the past four years Councils have given an average rating of 1.6 on a scale of 0 (none) to 3 (high).

In 2015–16, six Councils in the region reported having a high level of liaison with local Indigenous groups. Examples include:

- Warren Shire Council has regular contact with the Aboriginal Community through a monthly interagency meeting
- Coonamble Shire Council consulted with the local Indigenous people (Clontarf) to discuss a tree planting event in 2016.

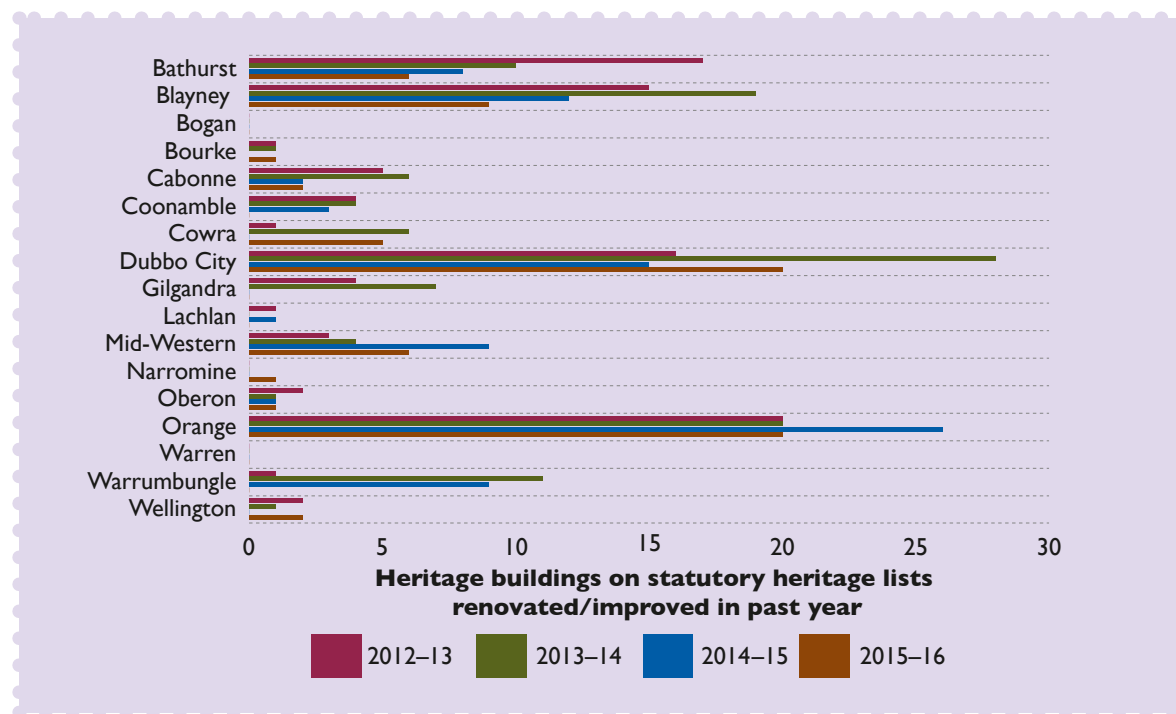


Figure 15: Heritage buildings on statutory heritage lists renovated/improved

Non-Indigenous heritage

Indicator – Actions to protect non-Indigenous heritage (including management plans)

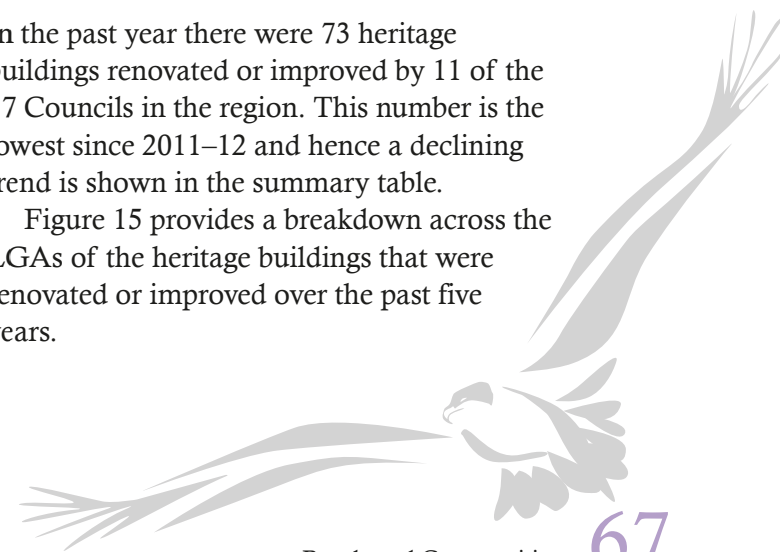
In 2015–16 there were 34 actions across the region to protect non-Indigenous heritage, which is less than last year but similar to previous years. Examples of projects included:

- Chinese Burner restoration in the Bogan LGA
- 14 people applied through Gilgandra Shire Council for a grant to improve their heritage significant house or property.

Indicator – Heritage buildings on statutory heritage lists renovated / improved in past year

In the past year there were 73 heritage buildings renovated or improved by 11 of the 17 Councils in the region. This number is the lowest since 2011–12 and hence a declining trend is shown in the summary table.

Figure 15 provides a breakdown across the LGAs of the heritage buildings that were renovated or improved over the past five years.





CASE STUDY: Community Gardens Grants (Mid-Western LGA)

Due to increasing interest in community gardens within the region, Mid-Western Regional Council trialed a new community grants initiative in 2016 targeting community not-for-profit organisations and schools. Grants of up to \$2,500 were available to improve or construct vegetable or sensory gardens or run educational workshops within schools or community gardens. The first round of applications opened in late 2015 and was very well received within the community with Council approving six applications:

- Wollar Public School “Kitchen Garden Project”
- Rylstone District Historical Society Incorporated “Upgrade the Thyme Out Community Garden in Rylstone”
- Mudgee Playgroup “Sensory Australian Native Garden”
- Cudgegong Valley Public School Gardens Club “Fruit Salad Garden Walk”
- Imaginations Early Learning Centre “Imaginations sustainable practices”
- Mudgee Uniting Church “Mudgee Uniting Church Community Garden”

The Garden Grant program aims to promote sustainability throughout the region by inspiring community members to participate in gardening programs within the community and at home. A focus for this round was engaging with children to motivate and encourage them to get involved in the garden.

For the next round of garden grants Council hopes to collaborate with Watershed Landcare and other community groups to improve this initiative by running a number of community education sessions within the newly upgraded public gardens.

Mudgee Uniting Church Community Garden



OPPOSITE: Volunteers
planting native trees
(Bathurst LGA)



Towards Sustainability

The term sustainability can have different meaning to different people. It's about taking what we need to live now, without jeopardising the potential for people in the future to meet their needs. Environmental sustainability involves making decisions and taking actions that are in the interests of protecting the natural world, with particular emphasis on preserving the capability of the environment to support human life.

Local Councils, which play a key role in managing the natural environment and leading by example, need a sound understanding of sustainability so they are able to reduce environmental impacts and associated costs and improve the quality of life for their local communities.

This chapter outlines what the Councils in the reporting region are doing to move towards environmental sustainability in the areas of:

- Waste management
- Resource purchasing and use
- Climate change
- Policies and procedures.

Condition

Solid Waste

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

Municipal: comprises general household waste and garden organics (including waste from the Councils' kerbside collections and waste taken directly to landfills by residents).

Construction and Demolition: includes waste from construction and demolition activities generally associated with development.

Commercial and Industrial: includes waste from commercial activities in the area including businesses and restaurants etc.

This waste requires transport, recycling where possible or disposal which uses significant energy resources, 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.

Indicator – Total waste entombed at primary landfill

Indicator – Total waste entombed at other landfills (excluding recyclables)

Total waste indicates consumption patterns and the pressures placed on rural tips and primary landfills.

Total waste to landfill for the region rose by 3.4% this year driven by increases of 10% or more in the Blayney, Bourke, Coonamble, Cowra, Gilgandra and Warrumbungle LGAs. However, the 2015–16 level for primary landfill is far less than that recorded in 2012–13 and below the average of the last three years.

As shown in Figure 16, this year the former Dubbo City LGA overtook Bathurst LGA as the largest contributor to landfill in

Table 7: Summary Table of Indicator Trends – Towards Sustainability

Issue	Indicator	2012–13	2013–14	2014–15	2015–16	Trend
Waste Generation	Total waste entombed at primary landfill (tonnes)	215,000	169,000	177,000	183,000	↑
	Total waste entombed at other landfills (exc recyclables) (tonnes)	6,964	21,569	27,841	28,310	↓
	Average total waste generated per person (tonnes)	0.98	0.83	0.88	0.91	→
	Average cost of waste service per residential household	\$263	\$269	\$268	\$282	↓
Hazardous/Liquid Waste	DrumMuster collections (number of drums)	52,612	30,289	37,313	26,418	↓
	Household Hazardous Wastes collected (kg)	15,893	31,865	40,139	43,560	↑
Reduce	Garden organics collected (diverted from landfill) (tonnes)	25,915	28,895	25,372	26,895	↑
	E-Waste collected (diverted from landfill) (tonnes)	62	99	41	49	↓
Recycle	Volume of material recycled (tonnes)	24,947	25,335	24,723	28,791	↑
	Volume of material recycled per person (kg)	110	111	107	124	↑
Littering and illegal dumping	Number of illegal waste disposal complaints to Council	401	402	441	323	↑
Engineering, Infrastructure and Civil Works	New road construction (km)	30	32	40	23	↑
	Road upgrades (km)	576	1,432	1,481	853	↑
Risk Management	Flood management plans/ flood mapping - increase in area covered (ha)	10,459	1,074	1,296	0	↓
	Hazard reduction burns (number)	74	61	15	22	↑
Climate Change Mitigation	Office paper used by Council (A4 reams)	29,273	27,400	26,709	25,427	↑
	Council sustainability initiatives (number)	58	43	64	72	↑
	Council mitigation initiatives (number)	18	12	15	18	↑
Council Greenhouse Gas Emissions	Annual electricity consumption for Council controlled facilities (MWh)	59,353	62,762	64,578	65,909	↓
	Annual natural gas consumption for Council controlled facilities (GJ)	30,372	35,561	35,048	35,465	↓
	Annual bottled gas consumption for Council controlled facilities (L)	41,832	44,429	48,287	38,040	↑
	Total fuel consumption (KL)	8,935	7,844	8,355	8,338	↑
	Council total operational greenhouse gas emissions (tCO ₂ -e/year)	221,000	191,000	210,000	213,000	↓
Community Greenhouse Gas Emissions	Small scale renewable energy uptake (kW installed)	8,858	10,561	11,399	11,807	↑
	Number of solar water heaters and heat pumps installed	479	407	401	274	↓

 improvement
  no or little change
  worsening trend

Note – the above trends are for data in 2012–13, 2013–14, 2014–15 and 2015–16 from the same sources. The trend is based on comparing the average of the previous years of reporting with 2015–16. They should be read in terms of the limitations for indicators discussed throughout this chapter. Note also that there are some new indicators for 2015–16 for which no comparison can be made with previous years. Refer to the Appendix for a list of Councils included in the trend data.

the region, with Bathurst LGA reporting a 5.5% decrease in waste to landfill and Dubbo City a 6.5% increase. Bathurst introduced a kerbside green waste collection in April 2016 which accounts for part, but not all, of this reduction.

Indicator – Average total waste generated per person

The average waste per person in the region was just over 0.9 tonnes in 2015–16. This average figure hides a large disparity between the rural LGAs such as Bogan, Cowra, Gilgandra and Wellington which all have a figure of around 0.3 tonnes per person

compared to the LGAs with larger population centres such as Bathurst, former Dubbo City, Mid-Western and Orange which each send over one tonne of waste per person per annum to landfill.

The level of average total waste generated per person has remained relatively constant over the past four years.

Indicator – Average cost of waste service per residential household

The average cost of waste services increased by 5.2% across the region compared with 2014–15, and it rose this year in most of the LGAs. This included Mid-Western LGA

whose cost returned to trend growth after a reduction last year. The only Council to report a lower waste service cost was Warrumbungle whose \$236 is now the second lowest cost per household in the entire region, after reporting above average costs in the previous four years.

Threats

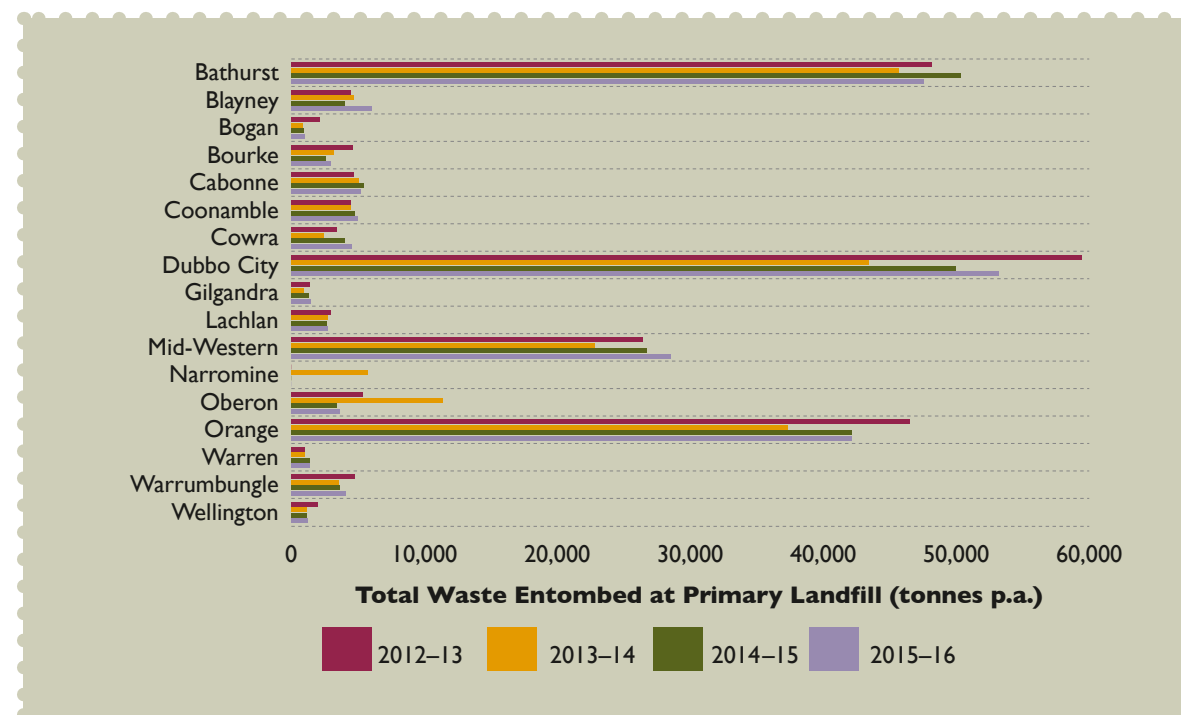
Illegal Dumping

The number of complaints about rubbish dumping does not necessarily reflect the frequency of incidents, nor the impact of illegal dumping. It does, however, indicate community awareness of illegal dumping and the potential impact that it may have on the environment.

Indicator – Illegal waste disposal complaints to Council

Complaints fell to their lowest level across the region since 2009–10 with notable reductions in the Coonamble, Cowra, Lachlan, Mid-Western, Warren and Wellington LGAs. Whilst complaints to Bathurst and Dubbo City Councils also declined, they now comprise 65% of the total for the region. Note that Bogan was the only Council to not receive any illegal waste disposal complaints in 2015–16.

Figure 16: Total waste entombed at primary and other landfills



Road construction and upgrades

Road construction and upgrades can have important economic and social benefits to a region. However, they can impact on the roadside environment which as previously noted in the Biodiversity chapter can retain significant remnant vegetation including threatened plant species and EECs.

Indicator – New road construction

Indicator – Road upgrades

New road construction and road upgrades increased from 2012–13 to 2014–15, then decreased in 2015–16. They both fell by 42% compared to 2014–15 with significant new road projects in only the Bathurst, Bogan, Dubbo City and Orange LGAs.

The 2015–16 decline in road upgrades was almost wholly due to the cessation of a grading program in the Narromine LGA which had reported approximately 650 kms of work on existing roads in each of the previous two years.

Greenhouse Gas Emissions

A greenhouse gas is a gas in the atmosphere that absorbs and emits radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases in Earth's atmosphere are water vapour, carbon dioxide, methane, nitrous oxide, and ozone. Without greenhouse gases, the average temperature of

Earth's surface would be about -18°C rather than the present average of 15°C .

Human activities since the beginning of the Industrial Revolution (taken as the year 1750) have produced a 40% increase in the atmospheric concentration of carbon dioxide, from 280 ppm in 1750 to 400 ppm in 2015. This increase has occurred despite the uptake of a large portion of the emissions by various natural "sinks" involved in the carbon cycle. Anthropogenic carbon dioxide (CO_2) emissions (i.e. emissions produced by human activities) come from combustion of carbon-based fuels, principally coal, oil, and natural

gas, along with deforestation, soil erosion and animal agriculture.

Recent estimates suggest that on the current emissions trajectory the Earth could pass a threshold of 2°C global warming, which the United Nations designated as the upper limit for "dangerous" global warming, by 2036. It has been estimated that if greenhouse gas emissions continue at the present rate, Earth's surface temperature could exceed unprecedented levels as early as 2047, with potentially harmful effects on ecosystems, biodiversity and the livelihoods of people worldwide.



The capacity of the Blayney Windfarm is enough to supply the annual electricity needs of 3,500 average Australian homes.

Figure 17: Council total operational greenhouse gas emissions 2015–16

The reporting region is a large producer of black coal and there is a heavy reliance on coal for electricity which is one of the highest sources of greenhouse gases. Councils can limit their impact by reducing their electricity consumption. This is a priority area for most Councils.

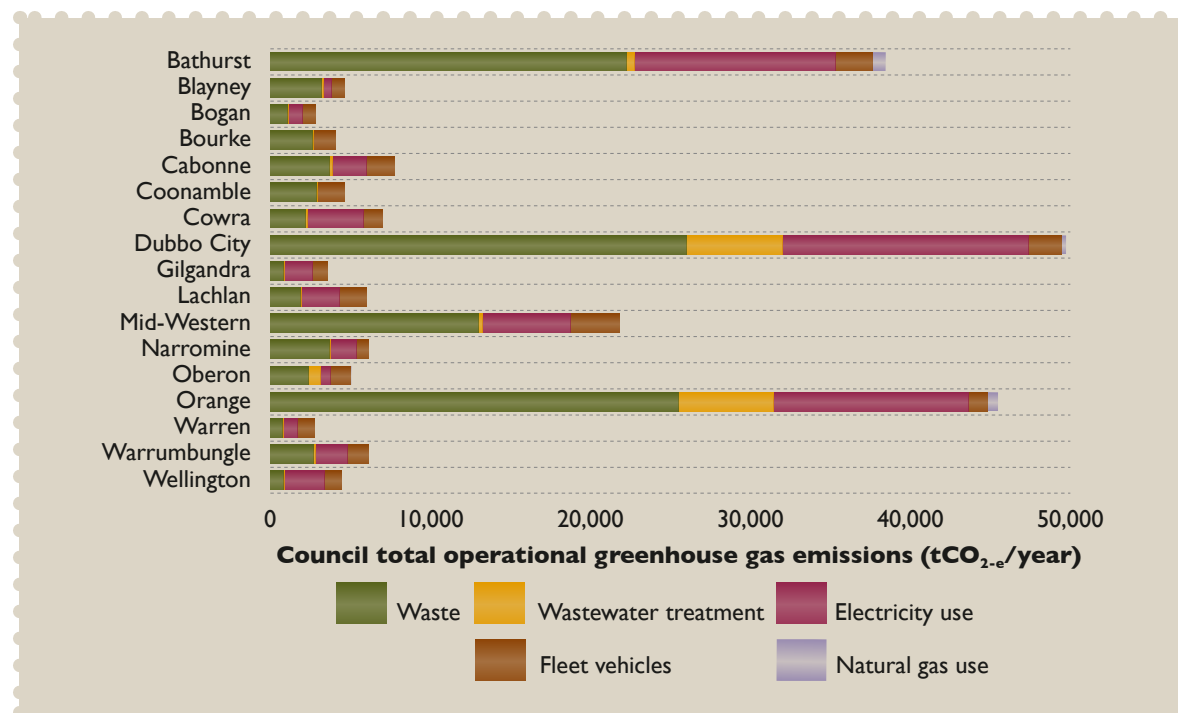
Indicator – Annual electricity consumption for Council controlled facilities

As shown in the summary table, the annual electricity consumption for facilities controlled by the Councils in the region has steadily increased since 2012–13.

There was a 2.1% increase in electricity consumption this year for the eleven Councils that have reported this data in each of the last four years, continuing an increasing trend in consumption over the last four years. Higher water use associated with dry weather can cause increased water pumping requirements and probably accounts for this increase. Contrary to this overall trend, there were five Councils that reported reductions in electricity use compared with 2014–15: Bogan, Cabonne, Gilgandra, Narromine and Orange.

Indicator – Annual natural gas consumption for Council controlled facilities

As with electricity, the use of gas provides an indication of contributions made by Councils to greenhouse gas emissions. It should be noted that natural gas has a lower carbon



footprint than conventional electricity, meaning that changes to the number of premises using gas instead of electricity could provide potential greenhouse emission reductions.

Annual natural gas consumption for Council controlled facilities has plateaued over the past three years after a large increase from 2012–13 to 2013–14.

Indicator – Annual bottled gas consumption for Council controlled facilities

Bottled gas has lower CO₂ emissions than some energy sources, such as coal fired electricity.

Bottled gas consumption declined by 21% for the eight Councils that have reported this data in each of the last four years. The biggest drop in usage was by Mid-Western Regional Council whose 5,312 litres was less half its consumption in each of the previous three years. Because of the declining usage in other LGAs, Dubbo City now accounts for almost 70% of the bottled gas for the entire region.

Indicator – Total fuel consumption

As with electricity and gas consumption, heavy vehicle fleet fuel use is a significant source of greenhouse gas emissions from Council operations.

Fuel consumption from Council owned vehicle fleet and plant was marginally lower in the 2015–16 for the fifteen Councils reporting this data in each of the last four years. It has remained relatively constant across the region in the past four years.

E10 consumption in the region is still less than 35% of regular unleaded petrol consumption whilst use of biodiesel and LPG is very low and continues to decline. Biodiesel consumption is only 26% of the 2010–11 level and LPG use fell 93% in the same time period to a very low level.

Indicator – Council total operational greenhouse gas emissions

Total greenhouse gas emissions calculated for the region in 2015–16 were 15.7% higher than last year. They are comparable with the level for 2013–14, although less than the 2012–13 estimate.

The largest contributing factor in this year's increase was a reduction in the methane flaring offsets from Dubbo City LGA and particularly Bathurst LGA where a problem with the motor on the methane flare meant that it was not operational for approximately four months.

Before offsets, the total emissions for the region (as shown in Figure 17) in 2015–16 rose by 6.7% from 2014–15. This was due to a combination of increased energy consumption and waste to landfill plus improved data inputs from some Councils.



Kate Bracks assists Bathurst Regional Council, Dubbo City Council and Netwaste to conduct cooking workshops as part of the Love Food Hate Waste Grant Program (Western College Dubbo)

Response

Waste Chemical Drums

Councils in the region are active participants in the DrumMuster program, which provides a collection service for agricultural chemical containers on an ongoing basis throughout the region.

Indicator – Farm chemical drums collected through DrumMuster collections

There was a 29% annual decline in the number of farm chemical drums collected through DrumMuster across the region in

2015–16. Approximately 26,500 chemical drums were collected which is the lowest in the nine years this data has been tracked and is less than a quarter of the figure for 2007–08. Note that there were no collections reported this year in the Narromine or Warren LGAs whilst Bogan LGA reported collections for the first time since 2008.

Hazardous Waste Collection

NetWaste and participating Councils have been working towards viable options for collecting and handling household hazardous waste items as there are currently limited alternative services available.

CASE STUDY: Nyngan Waste and Resource Recovery Facility (Bogan LGA)

On the 13 January 2015, Bogan Shire Council was granted approval by the Joint Regional Planning Panel for a Development Application which involved environmental improvements and an extension to the Nyngan Waste Depot. This included not only increasing the security of the site which had been unmanned for many years, but also allowing for the site to increase its compliance in environmental monitoring, as well as the recovery of recyclable materials. The aim was to thereby reduce the amount of waste going to landfill and the facility was subsequently renamed the Nyngan Waste and Resource Recovery Facility.

Since the approval was issued to undertake extension works, modifications have been required. However, in the last year Council was successful in obtaining grant funding from the NSW Environmental Trust which assisted it in commencing the first step in the process of securing the site with new boundary fencing, CCTV cameras and signage.

There have been delays to the project as a result of significantly high rainfall since April 2016. These delays have allowed Council to increase community consultation in respect to how the new facility will operate, particularly with the processing of payments when accepting waste at the site, as well as increasing the commitment to recycling and separation of materials on the site.

Council seeks to further increase community consultation in order to reduce any illegal dumping incidents and the subsequent issuing of penalty infringement notices.

Council endorses the changes occurring to the facility, which are a positive step forward in environmentally conscious waste management in Nyngan.

This also achieves the essential goal, acknowledged by the community, within the Bogan Shire Community Strategic Plan 2015–2019. As a result, the Bogan Shire community has been proactive in the environmental improvements seen onsite so far, and it is envisaged that the facility will continue to be well maintained and achieve regulatory compliance into the future.



Nyngan Waste and Resource Recovery Facility
Levelling of Existing Site for Recycling Drop off
Area, February 2016

Indicator – Household Hazardous Wastes collected

This year saw continued growth in the amount of household hazardous waste recycled through the NetWaste contract, up a further 8.5% on 2014–15. Dubbo City LGA had by far the highest amount with almost 13,000kg collected in 2015–16: more than double the previous highest total over the last six years.

Reducing waste disposal

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.

Indicator – Garden organics collected (diverted from landfill)

There was a 7.5% increase in garden organics collected this year lifting the regional total to its highest level since this indicator was first reported. Increases were reported in ten LGAs with Orange's increase to over 13,000 tonnes meaning that it contributed about 48% of the total for the entire region.

Cowra Shire Council reported a slightly lower number due to the removal of an EPA green waste exemption which means it can no

longer recycle and reuse leaf litter mulch on Cowra parks and gardens, due to potential weed propagule content. This change is likely to also impact garden organic collections in other LGAs.

Indicator – E-Waste collected (diverted from landfill)

E-waste items sometimes contain precious metals such as copper and platinum that should be reused. Computer screens and TVs contain toxic chemicals such as lead, mercury and arsenic, which can leach out from landfills and into waterways.

The e-waste collected is diverted from landfill and around 95% of raw materials recovered are recycled.

E-waste collections recovered slightly from their low last year. But despite a 20% increase in 2015–16 they are still low when compared to the 2010–14 period.

Mid-Western Regional Council had the highest e-waste collections this year, with 13.8 tonnes. Cabonne LGA, which had the highest tonnage last year, reported zero because its e-waste has been stockpiled and will not be sent for recycling until next year.

Indicator – Office paper used by Council

As relatively large employers and community leaders, local Councils can be used as one indicator of changing office practices and increased awareness to minimise the use of office paper.

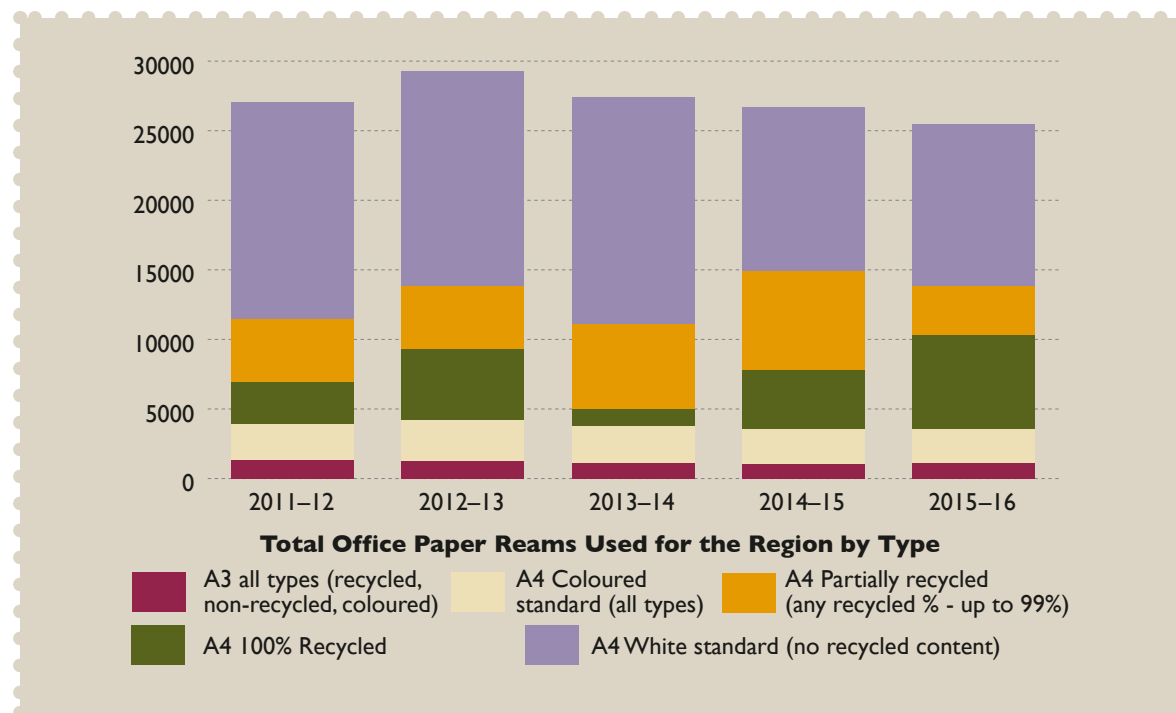


Figure 18: Amount of office paper used across the region

Over the past four years there has been a continuing slow but steady decline in the total quantity of office paper used by Councils across the region as shown in the summary table. This year there has also been a move by several Councils to using 100% recycled paper instead of partially recycled paper as shown in Figure 18.

Reuse

After reduction of potential waste, reuse is the next most effective method of waste management. This should be done prior to discarding or recycling any materials.

Indicator – % Effluent reuse & location of reuse

Eight councils reported reuse of effluent and/or biosolids during 2015–16. This is an increase from 2014–15 when only three Councils reported effluent reuse. Examples included:

- Soil Improvement (biosolids and effluent) at the Greengrove Effluent Reuse Irrigation Facility in the Dubbo City LGA
- Biosolids reuse for a contracted agricultural land application in the Bathurst LGA.

CASE STUDY: Food and Garden Waste Kerbside Collection (Bathurst LGA)

Bathurst Regional Council, a member of the Netwaste group, is committed to improving the provision of waste services across the Bathurst LGA. Kerbside co-mingled recycling has been in place since 1998 and the next opportunity to divert significant levels of waste from landfill was to move to a three bin system.

Council, in collaboration with neighbouring Parkes Shire Council and Forbes Shire Council, considered the feasibility of a three bin system ahead of applying for funding under the NSW Environmental Trust Waste Less Recycle More Initiative. Council was successful in receiving \$787,800 which was used to offset the cost of kerbside bins and kitchen caddies for households.

Ahead of a tender process, Council undertook the first of two community surveys designed to test the attitudes and behaviours of residents with regard to existing waste services and found:

- 59% of respondents put garden waste in their garbage bin
- 81% of respondents put food waste in their garbage bin

Bin audits also indicated that the waste stream contained nearly 64% organic material, supporting the case for the three bin system.

A tender process conducted throughout 2015 led to the appointment of JR Richards and Sons as the collection contractor and Australian Native Landscapes (ANL) as the receiving contractor where food and garden waste will be taken to a specially designed facility at Blayney.

An extensive program of community education commenced well ahead of the collection service starting in April 2016. Envirocom was engaged to support the Councils with the rollout of an education program in order to raise awareness and promote correct use of the service to maximise the amount of waste which can be diverted from landfill

A comparison of figures between May 2015 and May 2016, indicate about 180 tonnes less has been brought to the Waste Management Centre in 2016 due to the introduction of the new food and garden waste service.

Figures from ANL indicate the following amount of food and garden waste has been received: 250 tonnes in April, 266 tonnes in May and to 17 June 119 tonnes have been received.

The contractual period for the current food and garden waste service is 10 years and it is expected that these numbers will increase over time as residents become more familiar with the service.



Bathurst Regional Council Waste Collection Truck unloading at the Waste Management Centre, September 2015 (prior to the food and garden waste collection service commencing) (Grant Paterson)

Recycle

Indicator – Volume of material recycled

Indicator – Volume of material recycled per person

The total amount of material recycled across the region was 16.5% higher in 2015–16 with an average 124kg recycled per person across the 16 LGAs which have reported this data in each of the last four years. As shown in the summary table, the 2015–16 level is the highest for the past four years.

The four LGAs with the highest recycling rates are Dubbo City, Gilgandra, Orange and Wellington which each reported over 150kg per person this year. The total for Orange LGA should have been even higher because glass is no longer included in its numbers as since 1 July 2015 (it is being transferred to Sydney under a contract with Visy MRF). The breakdown of the type of materials recycled in each LGA is shown in Figure 19. Note that this breakdown is less accurate than in previous years because recycled material collected through Netwaste is transferred as commingled recycling to Sydney under a contract with Visy MRF, so it can only be reported as “other”.

Resilience to natural hazards

As noted previously in this report, the region has been impacted greatly by natural hazards in the past four years. These natural hazards include flood, drought, heatwaves and bushfires.

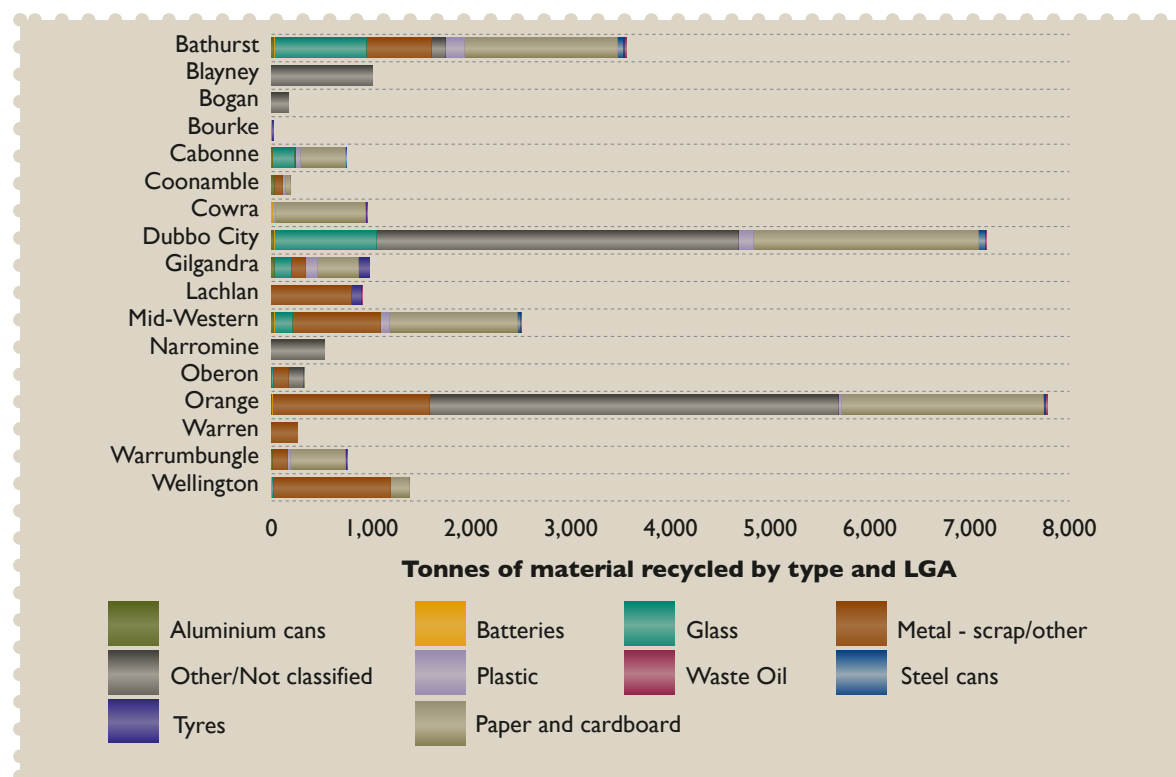


Figure 19: Type of materials recycled 2015–16

Resilience is defined as the ability of a community or ecosystem to ‘bounce back’ to normal functioning after a crisis (emergency or disaster). Some communities can transform, improve and therefore ‘bounce forward’ after these events.

Risk mitigation is a key to natural hazard resilience and in the region includes the preparation and implementation of flood and bushfire risk management plans.



Indicator – Flood management plans/flood mapping – increase in area covered

The NSW Floodplain Development Manual (2005) requires Councils to prepare floodplain risk management studies and plans for flood-impacted communities within their LGA.

Over the past four years, 12,829 hectares of flood-prone land in the region has been mapped, analysed and covered by floodplain risk management plans. Plans have been developed in Cowra, Warrumbungle, Bourke and Orange LGAs.

CASE STUDY: Discrete Aboriginal Communities waste project (Bourke LGA)

Waste Aid has been working with the communities of Bourke and Enngonia over the last 12 months on a pilot project aimed at providing long-term solutions for waste management and environmental health issues in remote, discrete Aboriginal communities.

The project has been guided by the Bourke and Enngonia Waste Advisory Committee (BE-WAC) consisting of local and state government, private enterprise and community organisations. More than \$164,000 in funding and in-kind contributions has been committed to the project.

In June 2016, Waste Aid completed the pilot project with the delivery of co-designed 'Hey you mob' waste education materials to the communities in Bourke and Enngonia. The project piloted in these communities was a three stage project consisting of a clean-up of the legacy of built-up waste, the provision of community appropriate waste infrastructure and the development of appropriate waste education materials.

An essential component to the success of the pilot has been the Aboriginal Community Environmental Stewardship model approach, which employs members of the community as Community Environment Advisors to oversee and maintain new waste management processes through engaging with communities, organisations and service providers.

The 'Hey you mob' education materials were co-designed by Waste Aid through extensive community consultation and engagement with the Aboriginal communities of Bourke and Enngonia to ensure that culturally and contextually appropriate materials were developed. The language and images were first created and tested through engaging local community organisations such as Literacy for Life "Yes I can" program and the Murdi Pakki Young leaders forum. Feedback from this engagement found that the community wanted to use positive language and images to encourage and empower the community to minimise the impact of waste on environmental and human health. The language and images were then tested in the communities by the Community Environment Advisors through a series of quantitative and qualitative feedback mechanisms.

The community suggested local art could be used and Brian Smith, a local Bourke Aboriginal artist, created the artwork 'River mob' which shows the interconnectedness of the Aboriginal communities in the Murdi Pakki region through the river and spirit. 'River mob' has been used as the background for the materials developed including signs, stickers for bins and cars and information pamphlets for households. The community suggested that each village would like to have a sign unique to their communities at its entrance in order to get greater community engagement through demonstrating connections to people and the local environment.

Using the co-design approach for 'Hey you mob' waste education resources has led to the creation of education resources which not only resonate with Aboriginal communities in the region but through the co-design process encouraged people in the community to engage with the issues of sustainable waste management more broadly. The community feedback on the pilot 'Hey you mob' waste education resources has been very positive, with the communities in Bourke requesting more and larger signs. Additionally feedback from BE-WAC members and other stakeholders involved in the Waste Aid project has been extremely positive and has highlighted the importance of working with the community to develop materials that are culturally appropriate and that resonate with the people.

Waste Aid have been invited by the Aboriginal communities to expand the pilot sustainable waste model and co-design and adapt the "Hey you mob" resources with communities in Brewarrina, Weilmoringle and Goodooga in 2016–17.

Hey You Mob poster



CASE STUDY: Growth of Dubbo's Sustainable City Expo & Science Festival (former Dubbo City Council LGA)

Crowd numbers at the 2015 Dubbo Sustainable City Expo & Science Festival on Saturday 10 October 2015 topped 1,000 – the biggest the event has recorded since first starting as an information night in 2006.

Former Dubbo City Council was amazed at the popularity of the event which dove-tailed with the Australian Museum's Science Festival for school students at the Western Plains Cultural Centre.

Part of the success of the 2015 expo was joining forces with the Australian Museum, the Central West Science Hub, local businesses and organisations, to provide a number of new and exciting activities.

The Australian Museum's Science Festival, held over two days preceding the Expo, introduced science to around 500 primary and high school students from around the Central West with interactive workshops, talks and science shows.

Many of the scientists and partners stayed on for Council's community event, the Sustainable City Expo & Science Festival. The event, which was free and open to the public, featured over 30 displays, including a range of sustainable living and hands-on science exhibits.

Both events provided a fantastic opportunity for the local community to better understand local and global environmental issues, find out how science can play a central role in tackling those issues, and highlighted possible actions people could take to reduce their impact on the environment.

'Inspiring Australia' and the NSW Government have continued their support of this event through the Central West Science hub partnership initiative which included former Dubbo City Council, Taronga Western Plains Zoo, Wambangalang Environmental Education Centre, the NSW Office of Environment and Heritage and the Dubbo Field Naturalist Society.

The collaboration with many state and national science educators also added a new dimension to the 2015 Expo. Supporting partners included the Australian Museum, the Siding Springs Observatory (including the Australian National University), the University of NSW, Macquarie University, Age of Fishes Museum, Larry Brandy, and the Indigenous Digital Excellence (IDX) Initiative.

The Dubbo Sustainable City Expo will return in 2016 and will continue to be an annual event.



Hands-on science and sustainable living exhibits



Native animal encounters with Taronga Western Plains Zoo

No new flood plans/flood mapping were completed in the region during 2015–16. Negotiations for flood studies for Blayney and Carcoar are ongoing but not yet completed and a flood study is still ongoing in the Coonamble LGA.

Indicator – Hazard reduction burns

Hazard reduction works provide areas of reduced fuel that can significantly reduce fire behaviour and aid fire suppression activities. There are different types of hazard reduction for bushfire including controlled burning, mechanical clearing like slashing undergrowth, or even reducing the ground fuel by hand.

Although hazard reduction burns are advantageous to the safety of communities and properties, they can have a deleterious impact on the natural environment if they are not conducted sympathetically with the appropriate fire regime for each vegetation community.

There were slightly more hazard reduction burns in 2015–16 than reported last year, but it was still the second lowest number for the region since 2009–10. Of the 22 burns reported, 19 were in the Mid-Western LGA, impacting 4,158 hectares.

Indicator – Natural disaster declarations

LGAs declared natural disasters are eligible for Natural Disaster Assistance Schemes. These schemes include disaster assistance for individuals, loans for primary producers, loans to small businesses and grants to Councils.

In 2015–16, Lachlan was the only LGA in the region that receive a natural disaster declaration for storms and floods in June 2016.

In 2014–15, Lachlan was the only LGA to received a natural disaster declaration for bushfires.

In 2013–14, bushfires in Warrumbungle, Bathurst and Oberon LGAs warranted natural disaster declarations.

In 2012–13, bushfires in Bathurst, Blayney, Bogan, Bourke, Cabonne, Cowra, Dubbo City, Gilgandra, Lachlan, Mid-Western, Narromine, Oberon, Orange, Warren, Wellington and Warrumbungle LGAs warranted natural disaster declarations.

In 2013, the NSW Government scrapped the system of state drought declarations as it overhauled the way it helps farmers prepare for and manage drought.

The declarations were replaced with Seasonal Conditions Reports, which offer farmers advice on what mitigation measures they should be considering.

Best environmental practices in road construction

As noted previously in this report, roadside environments may contain the only local stands of remnant vegetation including threatened species and EECs. Best environmental management practices should be used and could include vegetation offsets, diversions around high conservation areas (e.g. koala habitat) and introduction of safe access methods for animals to cross.

Indicator – Application of best practice environmental management (BPEM) in new roads

Ten of the seventeen Councils in the region reported that they did already include BPEM in new road projects.

Four Councils (Bourke, Cabonne, Lachlan and Orange) indicated that they do apply design measures in new infrastructure in response to climate change.

Council sustainability initiatives

These indicators have been introduced to try and better gauge how proactive the Councils are in response to sustainability and climate change challenges.

Indicator – Inclusion and demonstrable implementation of environmental sustainability criteria within purchasing policies

Eleven Councils report that they do include environmental sustainability criteria within their purchasing policies. A good example is Bogan Shire Council which added Environmental Sustainability controls to the Procurement and Purchasing Policy adopted by Council in 2016.

Indicator – Council sustainability initiatives

The number of Council sustainability initiatives has generally increased over the past four years. The increase in this indicator

in 2015–16 (see summary table) comes largely from the Bourke and Orange LGAs. Bourke Shire Council reported five initiatives, having reported none in previous years, with programs such as weeds and waste education in local schools and waste education for Indigenous communities.

In past years, examples of sustainability initiatives include lighting changes in Oberon Council and an in-house campaign in Cabonne Council for staff to turn off lights and computers when they leave. Some initiatives such as Dubbo City's Sustainable City Expo & Science Festival are highlighted in case studies in this report.

Indicator – Council mitigation initiatives

Climate change mitigation refers to efforts to reduce or prevent emission of greenhouse gases. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behaviour.

The number of Council climate change mitigation initiatives decreased in 2013–15 from that reported in 2012–13, and then rose in 2015–16.

Mitigation initiatives reported by Councils this year included increased tree planting in the Bogan, Bourke and Dubbo City LGAs plus several other initiatives in the Dubbo City LGA, including the use of solar pool heating and solar energy on at least 11 Council buildings.

CASE STUDY: Lachlan Landfill Closures (Lachlan LGA)

The design and delivery of landfill closure plans and the implementation of post closure management will minimise the risks of environmental damage and adverse impacts on human health. Critical to an effective landfill closure plan is the application of the landfill final cover that should isolate the waste and ensure its controlled stabilisation. The cover will minimise the infiltration of water from precipitation after the landfill has been closed; control surface water; restrict the production of leachate that may enter the water table; promote re-vegetation; protect groundwater; limit the uncontrolled release of landfill gases; and eliminate litter.

Lachlan Shire Council has examined the operation of its waste facilities and prepared a management plan that included the rationalisation of the current sites. Engagement with affected communities was undertaken and a determination made by Council that the domestic waste collection service be extended to include the township of Fifield, Derriwong, and Albert. Landfills at Fifield, Derriwong and Albert are now closed with a transfer station put in place with the use of Bin Banks. There is no intention to use the Fifield, Derriwong and Albert site for alternative purposes and the sites are to be rehabilitated and maintained as open space.

Surface water management and erosion control form an important facet of the sites' rehabilitation, as will establishing suitable plants and grasses. Post-closure management must be addressed to ensure the site does not pose an ongoing and unacceptable risk to the environment and human health.

The landfill closures at Fifield, Derriwong and Albert will introduce better management practices to the communities, allow regulation and monitoring of waste entering each facility and prevent illegal dumping of hazardous material.



Closed landfill site, Fifield.

CASE STUDY: Gilgandra Shire Council Landfill Rationalisation (Gilgandra LGA)

Gilgandra Shire Council received a grant from the NSW Environmental Trust to assist Council in the rationalisation of its rural waste facilities, with the aim to improve how waste is managed across the Shire. After several meetings and community consultation sessions, a decision was reached to close the rural waste facilities of Armatree and Tooraweenah using grant money and Council in-kind contributions. Although grant money only funded the closure of Armatree and Tooraweenah facilities, the project was expanded to include the closure of Curban and Biddon transfer stations.

In reaching its decision on the closure of the rural waste facilities Council considered the following facts:

- The village landfills at Armatree and Tooraweenah had limited residual life in their landfill cells.
- The facilities were unmanned sites and attracted negative issues such as illegal dumping and scavenging, vandalism breaking locks and gates and instances of gates being left unlocked for non-residents to use the site.
- Improper disposal of farm chemical drums.
- Proposed changes introduced by the NSW Government to the Waste Regulations on 1 November 2014 and the Section 88 Waste and Environment Levy (*Protection of the Environment Operations Act 1997*).
- The funding opportunities presented by the Waste Less Recycle More grants program.

Gilgandra now has one central waste facility and waste can be more easily managed. The closed sites have been capped and rehabilitated using native grass species, in accordance with approved closure plans. A new domestic waste collection contract has also commenced and includes expanded services into the villages of Armatree and Tooraweenah.

There have been numerous social, economic and environmental benefits associated with the landfill closures such as:

- A notable increase in residents recycling habits as a direct result of the implementation and convenience of a kerbside collection service
- Council's financial position has been improved as a result of the cost savings achieved with the closure of the satellite waste facilities
- Risks of groundwater contamination from leachate, illegal dumping of hazardous materials, and lighting of fires with potential for airborne toxic material to be spread and the spread of windblown litter have been mitigated or eliminated.

The process of closing the rural waste facilities required good planning, effective time management as well as open and honest discussions and communication with all stakeholders involved in the process. This project has been very beneficial for Council and the community, providing improved environmental outcomes regarding waste management in Gilgandra.



Armatree in March 2016



Armatree in August 2016



Jason Hodges, special guest at the Sustainable Living Expo with Cr Gary Rush, Mayor of Bathurst, April 2016 (Grant Paterson)

Indicator – Council adaptation initiatives

Adaptation refers to dealing with the impacts of climate change whilst mitigation means dealing with the causes of climate change by reducing emissions. Adaptation involves taking practical actions to manage risks from climate impacts, protect communities and strengthen the resilience of the economy.

By 2015–16, six Councils (Bathurst, Coonamble, Dubbo City, Gilgandra, Lachlan and Orange) indicated that they had adaptation initiatives in place. Examples from Dubbo City Council include: Drought and

Demand Management Plans, Energy Strategy and Implementation Plan, intelligent irrigation systems.

Renewable energy

Renewable energy comes from natural sources that can be replaced or ‘renewed’ without harming the environment or contributing to the greenhouse effect and global warming. It is usually a form of energy that is collected from resources which are naturally replenished on human timescales such as sunlight, wind, rain, tides, waves, and geothermal heat

Indicator – Council facilities consuming Greenpower

The GreenPower Program is a government managed scheme that enables Australian households and businesses to displace their electricity usage with certified renewable energy, which is added to the grid on their behalf.

No consumption of Greenpower by Council facilities was reported for the entire region during this year due to the increasing expense of GreenPower. A number of Councils are focusing on building their own renewable energy installations. Blayney Shire Council reported the use of Greenpower in 2014–15.

OPPOSITE: Environmental
Law Workshop facilitated
by the Central Tablelands
and Central West Local
Land Services

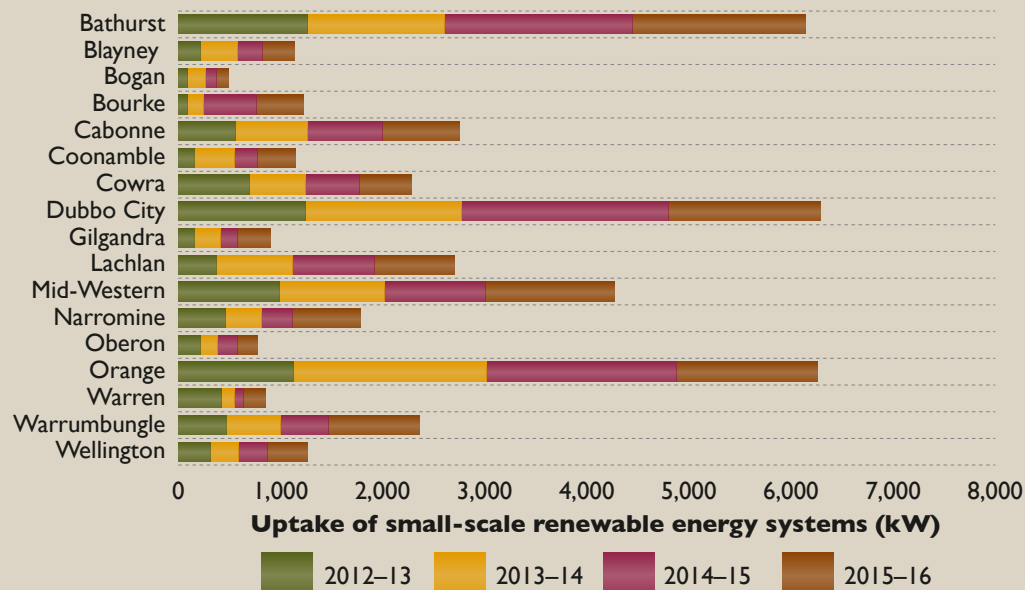


Figure 20: Uptake of small-scale renewable energy systems across the region (kW)

Indicator – Proportion of Council’s electrical energy demand met from Council-owned renewable energy infrastructure

Bathurst, Dubbo City, Gilgandra and Orange Councils have each installed solar panels at some of their facilities and Warrumbungle Shire Council has recently installed solar panels which will come on stream in 2016–17. The number of Councils using renewable energy infrastructure has slowly risen over the past four years. As yet, the infrastructure put in place by these pioneering Councils only provides a small proportion of their energy demand.

Indicator – Small scale renewable energy uptake

The Small-scale Renewable Energy Scheme creates a financial incentive for property owners to install eligible small-scale installations such as solar water heaters, heat pumps, solar panel systems, small-scale wind systems, or small-scale hydro systems. This indicator tracks the total kilowatts installed for solar panels and small-scale wind and hydro systems.

As shown in Figure 20, the growth in the rate of installations of small-scale renewable energy systems in the region appears to be slowing with only a 3.6% increase compared to 2014–15. The 11,807 kilowatts installed in 2015–16 was the largest annual total yet and is more than double the level in 2011–12.



Indicator – Number of solar water heaters and heat pumps installed

An estimated 274 solar water heaters and air sourced heat pumps were installed across the region in 2015–16. This was 32% less than last year and is not much more than a third of the number installed in 2011–12. With this kind of technology there is an early adopter



wave driven mostly by environmental concerns after which there are relatively small numbers of consumers able or prepared to pay the switching cost so the adoption wave may peter out. Further uptake probably needs to be driven by building regulations and/or much more significant cost advantages compared with traditional water heating systems.

CASE STUDY: Warrumbungle Shire Council Solar Installation Program (Warrumbungle LGA)

Warrumbungle Shire Council has a strong commitment to preserving the region's environment and is continually taking practical steps to demonstrate ongoing sustainability practices in action.

With true sustainability only achievable through strategic long term thinking, Council embarked on a solar panel installation program targeting its high tariff owned assets. A review was undertaken of the energy consumption of the higher tariff sites that largely operate within daylight hours by an independent consultant, to establish which sites would benefit most by installing solar energy systems on buildings.

Some of the larger consuming sites identified were the water treatment and sewage plants which, due to the nature of people, experienced their highest levels of consumption during early mornings and in the evenings. With this in mind, the investigation proceeded to identify high tariff sites such as Administration Centres, Council Depots, Day Care and Community Care that operate predominantly during business hours that would see positive benefits from solar installation. From the investigations; 10 sites across the Shire were identified.

The installation was undertaken in July 2016 with 142 Solar PV panels installed which are estimated to contribute an average of 31.3% of site electricity needs.

The project was completed at the end of June 2016. Benefits in reduced energy costs have been seen immediately following monitoring of energy tariffs two months post installation, with one building's electricity costs nearly halved compared to the previous quarter.

While conservative, the following benefits are expected:

- Predicted energy cost reduction per annum for Council is \$35,849
- Solar PV Systems on average will reduce site load by close to 25%
- Predicted annual energy savings of 21%
- Predicted CO₂ reduction for the Shire of 112 tonnes per annum.

Yuluwirri Kids is a Warrumbungle Shire Council owned and operated pre-school and long day care centre. As a substantial daytime energy user, 20 Solar PV panels were installed in June 2016 with savings of approximately 60% estimated in the first 12 months.





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Appendix — Data contributed by and sourced for Councils

Issue	Sub-Issue	Indicator	Unit of Measure	Bathurst	Blayney	Bogan	Bourke	Cabonne	Coonamble	Cowra	Dubbo City	Gilgandra	Lachlan	Mid-Western	Narramine	Oberon	Orange	Warren	Warrumbungle	Wellington	Dubbo Regional	Central West LLS	Central Tablelands LLS		
Land																									
Land use: planning and management	Contamination	Contaminated land sites - Contaminated Land Register	Number	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆					
		Contaminated land sites - potentially contaminated sites	Number	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆					
		Contaminated sites rehabilitated	Number	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆					
	Erosion	Erosion affected land rehabilitated	Hectares	●	◆	●	◆	●	◆	◆	◆	●	◆	◆	●	◆	◆	◆		●		●			
		Number of development consents and building approvals	Number	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆					
		Landuse conflict complaints	Number	◆	◆	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
Agricultural Land	Sustainable agriculture	Loss of primary agricultural land through rezoning	Hectares	◆	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆						
Mining		Farm entities demonstrably practicing sustainable agricultural practice	Hectares									●										●	●		
		Number and type of operating mines and quarries, licenced under EPA PO& EO Act	Number	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆	◆		◆			
		Area covered by Extractive Industries and mining exploration projects	Hectares	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆		◆				
Biodiversity																									
Biodiversity	Habitat Loss	Total area in the National Parks Estate	Hectares	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆					
		Vegetation protected and rehabilitated through CMA incentive funding	Hectares																			●	●		
		Council Reserves - total area	Hectares	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	●					
		Council Reserves - bushland/remnant vegetation	Hectares	◆	●	◆	◆	●	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	●	●					
		Voluntary Conservation Agreements, Property Vegetation Plans & biobanking	Number																			●			
		Total Area of State Forests	Hectares	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				

Issue	Sub-Issue	Indicator	Unit of Measure	Bathurst	Blayney	Bogan	Bourke	Cabonne	Coonamble	Cowra	Dubbo City	Gilgandra	Lachlan	Mid-Western	Narromine	Oberon	Orange	Warren	Warrumbungle	Wellington	Dubbo Regional	Central West LLS	Central Tablelands LLS
Biodiversity	Habitat Loss	Total Area protected in Wildlife Refuges	Hectares	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
		Area protected under voluntary conservation agreements and property agreements	Hectares	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
		Extent of Traveling Stock Reserves in LGA	Hectares	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●			
		Habitat areas revegetated	Hectares	◆	●	◆	◆	◆	◆	●	◆	◆	◆	◆	●	◆	◆	◆	◆	◆			
		Roadside vegetation management plans	Yes/No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
		Roadside vegetation rehabilitated	Hectares	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●			
	Decreasing occurrence of endangered species	State Threatened species listed in Central West & Lachlan Catchments	Number & list of species																				
		Threatened species actions implemented (e.g. PAS, recovery plans)	Number	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
		Fish restocking activities: native species	Number	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
Noxious weeds and feral animals	Fish restocking activities: non-native species	Number	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
	Number of declared noxious weeds	Number of species	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
	Invasive species (listed noxious or WONS) under active management	Number of species	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆				
Water and Waterways																							
	Surface & Ground Water Quality	Average Turbidity in selected streams	NTU	◆				◆		◆				◆		◆				◆			
		Average Total Nitrogen in selected streams	mg/L	◆				◆		◆					◆		◆				◆		
		Average Total Phosphorus in selected streams	mg/L	◆				◆		◆					◆		◆				◆		
		Average salinity levels in selected streams	EC	●		◆		●	◆	●					◆		●				●		
		E.coli remote from wastewater treatment plants	Organisms per 100mL	◆	●			●	●			◆	◆	●	◆		◆		◆				

Issue	Sub-Issue	Indicator	Unit of Measure	Bathurst	Blayney	Bogan	Bourke	Cabonne	Coonamble	Cowra	Dubbo City	Gilgandra	Lachlan	Mid-Western	Narramine	Oberon	Orange	Warren	Warrumbungle	Wellington	Dubbo Regional	Central West LLS	Central Tablelands LLS
	Riparian	Riparian vegetation recovery actions	Number	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆			
		Riparian vegetation recovery area	Hectares	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆			
	Industrial/ Agricultural Pollution	Load Based Licencing volume	Total kg of pollutants	◆	●	●	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	●				
		Exceedances of license discharge consent recorded	Number	◆	●	●	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆	●		◆			
		Erosion & Sediment Control complaints received by Council	Number	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		●			
	Stormwater Pollution	Number of gross pollutant traps installed	Total number of GPTs currently installed	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
		Total catchment area of GPTs	Hectares	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	●	◆			
		Water pollution complaints	Number	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	◆			
Water quantity and drinking water quality	Surface & Ground Water Extraction	Number of Water Supply Work Approvals from surface water sources	Raw number	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆		◆		
		Volume of surface water permissible for extraction under licences	Gigalitres (GL)	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆		◆		
		Actual volume extracted through surface water licences	Gigalitres (GL)	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆		◆		
		Number of Water Supply Work Approvals from groundwater resources	Number	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆		●		
		Volume of groundwater permissible for extraction under licences	Gigalitres (GL)	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆		◆		
		Actual volume extracted through groundwater licences	Gigalitres (GL)	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆		◆		
	Council Water Consumption	Council managed parks, sportsgrounds, public open	Hectares	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
		Area of irrigated council managed parks, sportsgrounds, public open space	Hectares	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●			
		Water used by council for irrigation (including treated and untreated)	Megalitres (ML)	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	●	◆			
	Town Water Consumption	Annual metered supply	Megalitres	◆	●	●	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	●	●	●			
		Annual consumption (Total from WTP)	Megalitres	◆	●	◆	◆	◆	●	◆	◆	◆	◆	◆	●	◆	◆	●	●				
		Total water usage per connection type	Megalitres per annum	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	◆			
		Level of water restrictions implemented	Level (1-5)	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●			

Issue	Sub-Issue	Indicator	Unit of Measure	Bathurst	Blayney	Bogan	Bourke	Cabonne	Coonamble	Cowra	Dubbo City	Gilgandra	Lachlan	Mid-Western	Narramine	Oberon	Orange	Warren	Warrumbungle	Wellington	Dubbo Regional	Central West LLS	Central Tablelands LLS		
Water quantity and drinking water quality	Town Water Consumption	Number of water conservation programs	Number of Programs	◆	●	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●						
		Number of residential meters	Number	◆	●	◆		◆	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	◆					
	Dam levels	Dam levels	Volume %		◆				◆			◆	◆		●					◆					
	Town Water Quality	Number of instances drinking water guidelines not met	Number of instances	◆	●	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆				
		Number of drinking water complaints	Number & Type	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
People and Community																									
Active community involvement		Environmental volunteers working on public open space	Person Hours	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	●					
		Number of environmental community engagement programs	Number of programs.	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	◆	◆				
		Number of growers markets/local food retailers specialising in local food operating within LGA	Number	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
Community Impacts		Number of days that air pollution maximum goals for particulate matter were exceeded	days	◆																					
Valuing natural, built and cultural heritage	Management of Aboriginal Heritage	Number of indigenous sites on AHIMS register	Number & Type	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆					
		Inclusion in DCPs & rural strategies	Yes/No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆					
		Extent of liaison with indigenous communities (self-assessed from 0 = none to 3 = High)	Rank (0 = none, 3 = High)	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆					
		Development on listed indigenous sites	Number approvals	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
		Management plan/ strategy in place	Yes/No	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
		Actions to protect indigenous heritage (including management plans)	Number	◆	●	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	●				
	Management of Non-Aboriginal Heritage	NSW Heritage Inventory items	Number and type	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
		Locally listed heritage items	Number and type	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
		Actions to protect non-indigenous heritage (including management plans)	Number	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	◆					
		Heritage buildings on statutory heritage lists demolished/degraded in past year	Number	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	◆				
		Heritage buildings on statutory heritage lists renovated/improved in past year	Number	◆	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				

Issue	Sub-Issue	Indicator	Unit of Measure	Bathurst	Blayney	Bogan	Bourke	Cabonne	Coonamble	Cowra	Dubbo City	Gilgandra	Lachlan	Mid-Western	Narromine	Oberon	Orange	Warren	Warrumbungle	Wellington	Dubbo Regional	Central West LLS	Central Tablelands LLS	
Toward Sustainability																								
Management of Waste and Resource Recovery	Waste Generation & Disposal	Total waste entombed at primary landfill	Tonnes/annum	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆				
		Total waste entombed at other landfills (exc recyclables)	Tonnes/annum	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆				
		Average cost of waste service per residential household	\$ per household	◆	◆	◆	◆	●	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆				
		Farm chemical drums collected through DrumMuster collections	Number of drums	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
		Household Hazardous Wastes collected	kg	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
	Waste Pollution	Garden organics collected (diverted from landfill)	Tonnes	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	◆			
		E-Waste collected (diverted from landfill)	Tonnes	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	◆			
		% Effluent reuse & location of reuse	%	◆	◆	●	◆	◆	◆	●	◆	◆		◆	●	◆	◆	◆	●	●	◆			
		Amount of material recycled	Tonnes	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	◆			
Littering	Number of illegal waste disposal complaints to Council	Number of complaints	◆	◆	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
Engineering, Infrastructure and Civil Works		New road construction	km	◆		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
		Road upgrades	km	◆		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	●			
		Inclusion and demonstrable implementation of environmental sustainability criteria within purchasing	Yes/No	◆		●	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	●	◆			
		Application of design measures in response to climate change in new infrastructure	Yes/No	●		●	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	●	●			
		Application of best practice environmental management (BPEM) in new roads	Yes/No	◆		●	◆	◆	◆	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	●	●			
Risk Management		Council adaptation initiatives	Yes/No	◆		●	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	●	●	●	◆				
		Increase in area covered by flood management plans/ flood mapping	hectares	◆	◆	◆	◆	●	◆	◆	◆	●	◆	◆	◆	◆	◆	◆	◆	◆				
		Natural disaster declarations (events - flood bushfire and drought)	Hectares	◆		◆	◆	◆	◆	●	◆	●	◆	◆	●	◆	◆	◆	◆	◆				
	Fire Regimes	Hazard reduction burns	Number & area	◆	●	◆	◆	◆	◆	◆	◆	●	◆	◆	●	◆	◆	◆	◆	◆				
Energy & Resource efficiency	Mitigation	Office paper used by Council (reams)	Number of reams ordered per annum	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
		Council sustainability initiatives	List	◆		●	◆	◆	◆	●	◆	●	◆	◆	◆	◆	◆	●	●	●				
		Council mitigation initiatives	List	◆		●	◆	●	◆	●	◆	●	◆	◆	●	◆	◆	●	●	●				

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Energy & Resource efficiency	Council GG Emissions	Annual electricity consumption for Council controlled facilities	MWh	◆	◆	◆		◆		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆				
		Annual natural gas consumption for Council controlled facilities	Gigajoules	◆	●	●	◆	◆	◆	●	◆	●	●	●	◆	◆	◆	●		●			
		Annual bottled gas consumption for Council controlled facilities	Litres	◆	●	●	◆	◆	◆	◆	◆		●	◆	●	◆	●	●		●			
		Total fuel consumption	Total Kilolitres per annum	◆	●	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	●	◆	◆			
		Council facilities consuming Greenpower (relate to State Govt goal of Greenpower uptake)	%	◆	●	●	◆	◆	◆	◆	◆	●	●	◆	◆	◆	◆	◆		●			
		Proportion of Council's electrical energy demand met from council-owned renewable energy infrastruc	%	◆	●	●	◆	◆	◆	◆	◆	●	●	◆	◆	◆	◆	◆	◆				
	Community GG Emissions	Small scale renewable energy uptake	kw installed by LGA	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆			
		Number of solar water heaters and heat pumps installed	Number	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆		

◆ Denotes those Councils that were compared in the trend analysis for these indicators

● Data contributed in 2015–16 but not compared in summary tables

□ Data not contributed





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