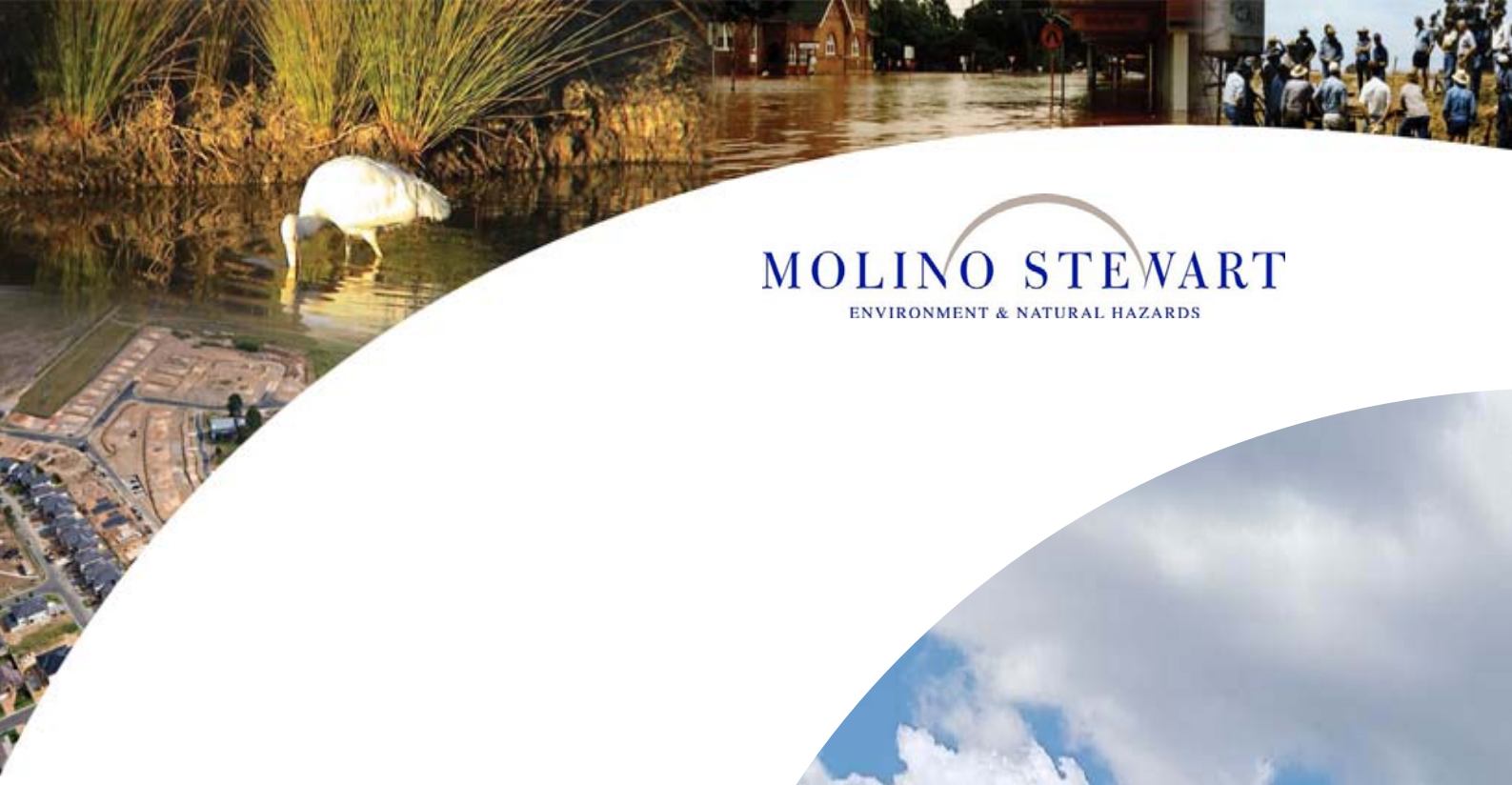

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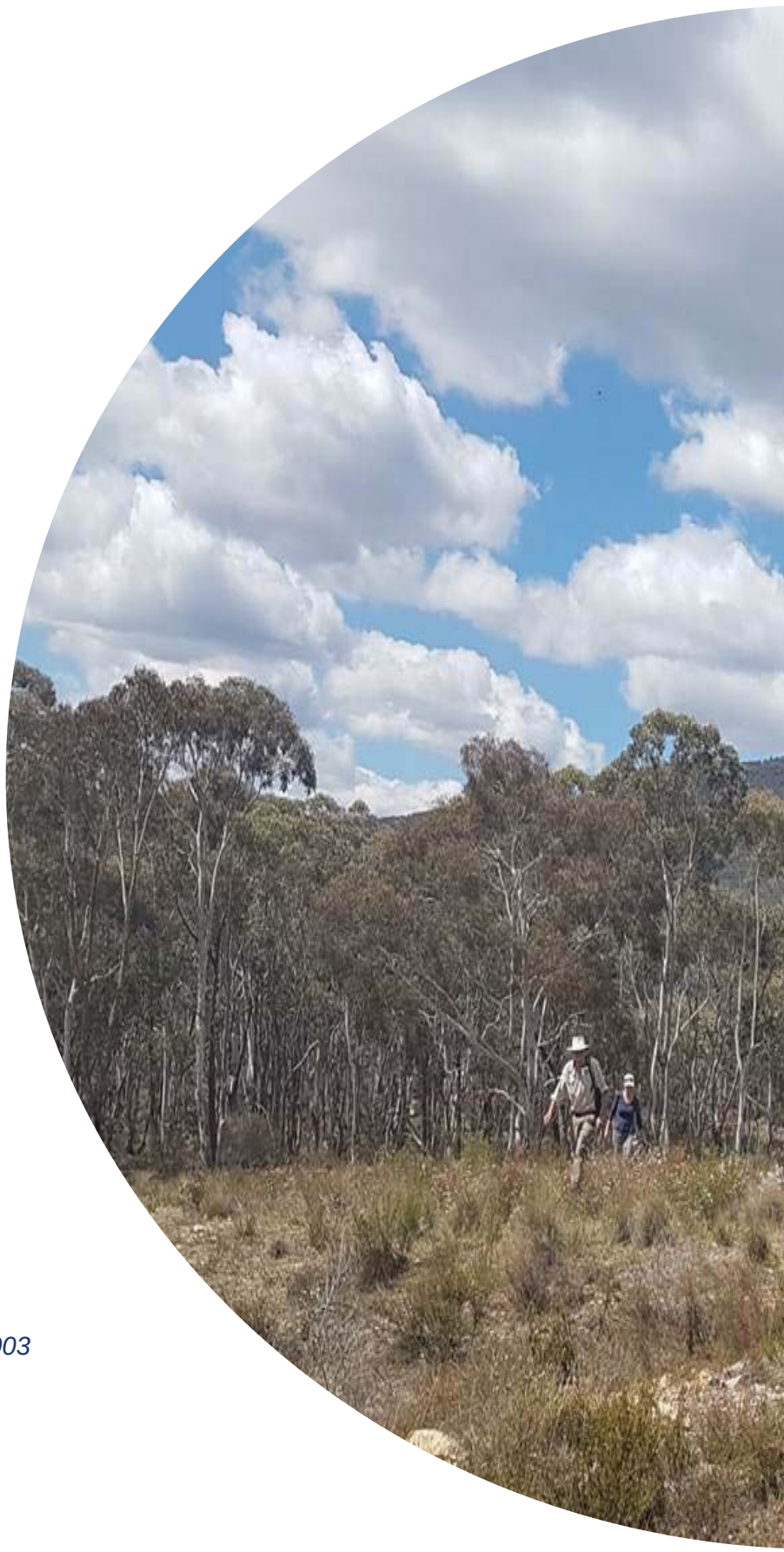

BATHURST
REGIONAL
COUNCIL

Bathurst Region Vegetation Management Plan 2019

Update to the Vegetation Management Plan 2003

MOLINO STEWART
ENVIRONMENT & NATURAL HAZARDS

Bathurst Region
Vegetation Management Plan 2019

UPDATE TO THE VEGETATION MANAGEMENT PLAN 2003

for

Bathurst Regional Council

by

Molino Stewart Pty Ltd
ACN 067 774 332

FEBRUARY 2019

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EXECUTIVE SUMMARY

This Vegetation Management Plan (VMP) has been prepared to update the original VMP to encompass all the changes since the original plan was adopted, including the amalgamation with Evans Shire Council, additional properties under the care and control of Bathurst Regional Council (Council), new suburban areas and the completion of a number of the recommended actions of the original VMP.

The original plan was prepared in response to interest from the community and to meet Council's desire to have a plan to guide community land management issues in a sustainable manner. This update of the VMP acknowledges the foresight of the original authors and key stakeholders in the preparation of a significant strategic guiding document, and expands upon it to address the management of vegetation in the rural villages, parks and reserves recognising the significant natural and rural landscapes throughout the Bathurst Region.

The updated VMP provides strategies and recommendations for vegetation management in the Bathurst Regional local government area (LGA), particularly land under the care and control of Council. It has been developed in recognition of the vegetation of the Bathurst Regional LGA, incorporating Bathurst City's cultural heritage, historic rural villages, agricultural landscapes, significant natural bushland, riverine gorges and floodplains.

The VMP identifies management principles for core themes, developed through the original and recent consultation with the community and interested stakeholders. These themes evolved through recognition that the Bathurst City and rural surrounds are characterised by both the existing natural physiographic features as well as influences from the built environment. It now encompasses the agricultural and natural landscapes that characterise the whole of the regional LGA. The plan reflects its origins in the heart of the Bathurst City featuring cultural exotic trees of cool climate origin, its newer suburbs and gateways with native species and its floodplain wetlands. It also now encompasses the surrounding historic villages with agricultural lands and steeply wooded slopes and gorges characterised by native vegetation of the central tablelands.

To accommodate for these characteristics, and to create an appropriate transition between the rural, village and urban landscapes, the following vegetation themes have been incorporated within the VMP.

Significant Landscapes

Bathurst Regional LGA is bounded in the east by the Great Dividing Range with plateaus, rugged hilly to mountainous terrain, and is incised by the Macquarie and Turon Rivers in the north with the Abercrombie River in the south and the Fish River in the southeast. The central low-lying floodplains are surrounded by timbered ridges and agricultural land provides significant landscapes for visual amenity and valued vistas into and out of the Region. These qualities have been highlighted for protection and enhancement.

Native Remnant Vegetation

The native remnant vegetation, comprising the Box-Gum Woodland of White Box Yellow Box Blakely's Red Gum woodland, is significant in the respect that it is listed as an Endangered Ecological Community (EEC) in NSW and a Critically Endangered Ecological Community in Australia. What remains is even more significant due to the widespread clearing of this community and the high level of fragmentation that has resulted. There are a few reserves where White Box is the dominant tree species while some are Derived Native Grasslands where the trees have been removed however the native ground layer remains.

Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland is another EEC located in the highlands parts of the Bathurst Regional LGA.

Since the original VMP was adopted, significant remnants around Mount Panorama have been strengthened through revegetation of linkages to the riverine environment. Revegetation has been undertaken to enhance significant corridors of native vegetation from Mount Panorama, through Boundary Road Reserve and the urban environment, to the Macquarie River. Another link has connected the remnants around Mount Panorama to Hawthornden Creek, providing strategically important links of remnant vegetation.

This theme is continued in the plan to restore remnant vegetation in rural and village areas as well as the Bathurst City, and to enhance its resilience to impacts including climate change.

Waterways

The waterways in Bathurst City require a considerable focus, with all systems in need of improved environmental function. Likewise, in rural areas, waterways have important values for water supply, scenic amenity, recreation, environment and habitat, and are in a range of conditions, with many suffering from degradation. In addition to environmental quality, recreation, visual amenity and education are also values to be enhanced through rehabilitation of the waterways. The foundation for improving environmental function is the restoration of waterways to a more natural state by stabilising degrading processes, the removal of exotic weeds and revegetation with native species.

Streetscape

The streetscape plays a strong role in providing a comfortable living environment, contributing to the visual amenity of the City and villages, and helps to define the character of an area. Successful street scaping with trees requires fundamental design and tree management principles to achieve maximum benefit. The key focus for vegetation management in the streetscapes is strategic tree planting based on sound design principles, adopting best management practices in tree care, and an expansion of village programs.

Parks and Public Reserves

The Bathurst Regional LGA has significant parks that need to be preserved or enhanced for their heritage, recreational and/or environmental value. The development of recreational areas is an important consideration in the VMP with opportunities for the Macquarie River and Turon Rivers being notable examples.

Gateways

The gateways into Bathurst City, particularly along the Great Western Highway and Mitchell Highway, have received considerable input to achieve a strong unified landscaped environment. The gateway themes recognise the transition between the rural and urban landscapes with natives merging to exotics. The CBD, being the ‘epicentre’, is vegetated wholly with exotics in the streetscape. The VMP also addresses gateways to rural villages and new developments.

Floodplains and Wetlands

The characteristic market gardens, active recreational areas and treeless expanses of the Bathurst floodplain landscapes are to be maintained, with potential for further development of the flood prone area for playing fields, such as along Hereford Street, if the need arises.

Council has commenced the restoration of wetlands that would contribute to improved conservation of biodiversity dependent on wetland habitats, stormwater management, recreation and educational opportunities.

Finally, implementation of the VMP over the ensuing decades is the responsibility of Council through partnerships with relevant government agencies and the community. As vegetation management is

dynamic, the VMP needs to be monitored and reviewed periodically to ensure its applicability and relevance is maintained.

Acknowledgements

The original Bathurst Vegetation Management Plan adopted by Bathurst Regional Council in 2003 was prepared by Terra Consulting Pty Ltd and authored by Barbara Mactaggart. The update to the Bathurst Vegetation Management Plan has been produced using the same structural format as the original report along with substantial extractions, in whole or part, of text, tables and appendices.

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APPENDICES

LIST OF TABLES

1 PART A: INTRODUCTION

1.1 BACKGROUND

Bathurst Regional Council (Council) has identified the need to update its 2003 Vegetation Management Plan (the Plan or VMP) of the Bathurst Regional Local Government Area (LGA) and commissioned Molino Stewart to undertake its preparation.

The original VMP reflects the foresight of the original author, Council, and the various community groups who worked for its development. The VMP has served as a landmark and comprehensive document guiding how vegetation is managed throughout the different parts of the city.

Following expansion of the LGA to the Bathurst Region, the updated VMP encompasses the land within the former Evans Shire, part of Oberon Shire, includes newly acquired land and reflects the achievements of the original plan.

The study area includes all lands and watercourses within the confines of the Bathurst Regional LGA, particularly land under the care and control of Council (to be referred to in the document as 'Council lands'). The area of coverage is 3,821 square kilometres.

1.2 AIMS OF THE VMP

The aims of the update of the VMP are to:

- Cover the entire Bathurst Regional LGA to reflect changes since the adoption of the original plan;
- Provide a document that will underpin and provide a basis for long-term strategies for vegetation management issues of all land in the Bathurst Regional LGA and particularly Council lands; and
- Reflect the recreational, environmental and heritage needs of the community, whilst being consistent with Council's strategic and statutory framework.

1.3 PLAN OBJECTIVES

The objectives of the VMP are to:

- Provide a working tool for Council to manage the vegetation resource and plan for the future;
- Provide the foundation and set the direction for developing specific vegetation management actions or work plans by Council, key stakeholders and the community; and
- Strengthen the cultural and environmental values of native and exotic vegetation within the Bathurst Regional LGA including its rural villages, through coordinated and sustainable vegetation management and planning.

1.4 REPORT FORMAT

The plan has been structured into three parts and appendices:

Part A — Introduction

- Section 1 Provides an introduction to the purpose of the Plan;
- Section 2 Gives an overview of the Bathurst Regional LGA;
- Section 3 Describes the planning process involved in preparing the VMP; and
- Section 4 Outlines regulation, compliance and planning principles required for VMP development.

Part B — Management Themes and Categories

- Section 5 Vegetation themes for the Bathurst Regional LGA;
- Section 6 Significant natural landscapes;
- Section 7 Native remnant vegetation;
- Section 8 Watercourses and drainage lines;
- Section 9 Streetscape;
- Section 10 Parks and public reserves;
- Section 11 Gateways of Bathurst Regional LGA; and
- Section 12 Floodplains and Wetlands of Bathurst Regional LGA.

Part C — Post-Plan Phase

- Section 13 Outlines the project costs; and
- Section 14 Discusses the implementation, monitoring and review of the VMP.

1.5 ACKNOWLEDGMENTS

The original Bathurst Vegetation Management Plan adopted by Bathurst Regional Council in 2003 was prepared by Terra Consulting Pty Ltd and authored by Barbara Mactaggart. The update to the Bathurst Vegetation Management Plan has been produced using the same structural format as the original report along with substantial extractions, in whole or part, of text, tables and appendices.

Acknowledgement is also made to the following parties for their input into the original plan and update:

- Council;
- The Bathurst Region Natural Resource Advisory Group who assisted Council in developing and implementing the original plan, as well as their contributions towards the update; and
- Community groups and members who contributed during the consultation process.

2 BATHURST REGION OVERVIEW

2.1 INTRODUCTION

The Bathurst Regional LGA has a unique character founded on the tablelands and rivers west of the Great Dividing Range and agricultural lands that occur within the Bathurst basin and surrounding foothills and ranges.

Bathurst Regional LGA was formed from the amalgamation of the Bathurst City, Evans Shire and a small amount of land from the Oberon Shire, and covers a total area of 3,821km^2. Villages and rural areas within the region include Perthville, Georges Plains, Rockley, Peel, Trunkey Creek, White Rock, The Lagoon, Fosters Valley, Tarana, Napoleon Reef, Winburndale Dam, Mount Rankin, Wattle Flat, Sofala, Sallys Flat, Hill End, Bruinbun, and Crudine.

Bathurst is the oldest inland settlement of NSW dating from the town proclamation in 1815, and has a long history of grazing, orcharding and market gardening. This was followed by gold mining in surrounding small towns in the 1850s and 1860s. Further expansion occurred with the construction of the railway line from Sydney and more gold discoveries in the 1870s and 1880s. Other growth periods were post war, during the 1970s and from the 1990s, with commerce and educational opportunities expanding. While there are large areas of natural vegetation and several large Nature Reserves, particularly in the eastern portions of the LGA, with such a long history of pastoral land use, most of the region has been cleared for farming. This VMP covers all lands and water courses within the Bathurst Regional LGA that are Council lands.

Exotic vegetation in the streets and parks of Bathurst reflect its cultural heritage which is echoed in exotic plantings in the streetscape of the historic villages. The surrounding rural lands possess characteristic native vegetation, which has adapted over time to the local climate, geology and soils. The introduced plantings have also had to survive the extremes of Bathurst's climate and geological and soil constraints which limit growth.

Bathurst City has grown, expanding from its core cultural heritage and rural identity and now encompasses new developments which need to incorporate vegetation for visual and thermal amenity as well to conserve biodiversity. Vegetation management is important in the rural villages and surrounding lands, and needs to respond to increased recreational visitation and warmer climate, as well as protection of its scenic quality within its agricultural setting.

2.2 BATHURST REGION'S LOCAL IDENTITY

The Wiradjuri people are the original custodians of the land in the Bathurst area, the easternmost part of their large traditional lands which included the Macquarie (Wombool) River. The native vegetation of the area formed an integral part of the cultural life of the people in providing food such as nectar, fruits, seeds and tubers, bags and baskets for carrying foods, as well as hollows for bees and possums. Plants provided resources for medicines and substances to stun or kill fish. Trees were used as materials for shelters, boomerangs, shields, canoes and message sticks. Carved trees formed part of the spiritual life marking ceremonial and burial grounds. Trees were also used to mark territories (Greenwood, 2013).

Bathurst Regional LGA vegetation present today is a result of the subsequent European pattern of settlement, cultural plantings of exotic trees suitable for the climate, and clearing for mining, farming, regional development and recreational uses.

Bathurst City's identity is characterised by historical buildings, parks and exotic trees as well as the physical features of the street layout, topography, floodplain, a rural backdrop and the interface between the urban and rural landscapes. The original wide street grid of Bathurst City laid out by James Byrne Richards slopes up to Mount Panorama in the south-west, and allows for views in a north-east direction with a rural backdrop (Moses, 1995).

Development in the floodplain is constrained by the potential of flood damage, and

separates Bathurst from Kelso, Eglinton and Raglan. The flood prone nature of the plain has left it to be retained largely for agriculture, playing fields and wetland management (Marshall, 2016).

In several locations there is an abrupt junction between rural and urban landscapes, such as the newer developments of West Bathurst, Mount Pleasant, the western side of Eglinton, and around the Abercrombie Estate. The plan recommends planting of vegetation to enhance visual and thermal amenity and to develop a local identity.

The historic villages of Rockley, Sofala, Hill End, Trunkey Creek, Perthville, Wattle Flat and Georges Plains as well as localities such as Sallys Flat, Peel, O'Connell, Napoleon Reef and Yetholme have important histories that link to the current character of vegetation across the Region.

Rockley is one of the oldest settlements having been surveyed by George Evans who crossed the Blue Mountains in 1813. The first land grant was to William Lawson in 1818 and the township was gazetted in 1851. The village vegetation is characterised by cultural plantings in several key streets, with native vegetation fringing Peppers Creek.

Sofala is the country's oldest surviving gold town, established when alluvial gold was discovered in 1851 and later quartz reef gold. The scenic village and surrounds are visited by tourists, recreational campers, artists and filmmakers. Whilst the village has cultural exotic vegetation, the showground features plantings of native trees and the surrounding area is characterised by riparian vegetation of the Turon River.

Hill End, once a small mining village, underwent a boom from 1871-1874 with many gold mines established and a large population settling. In 1967 it was declared an Historic Site. The village is now jointly managed by Council and the NSW National Parks and Wildlife Service. The exotic vegetation in the village gives way to remnant native vegetation on the outskirts.

Trunkey Creek is a small village close to the junction of the Abercrombie River and Grove Creek, surrounded by abandoned mine shafts and remains of quartz reef gold mines. It features a popular camping reserve and playing field near the school with surrounding remnant bushland.

Perthville is a historic village proclaimed in 1855 on Queen Charlottes Vale Creek. Vale Road is known for its significant avenue of planted Elm trees as well as a historic church linked to Saint Mary MacKillop. The Brian Booth Recreation Reserve is named for the local born test cricketer.

Wattle Flat was a farming area which expanded in 1855 when gold was discovered in the area. The historic churches are surrounded by remnant native vegetation. The Wattle Flat Racecourse, golf course, oval and sports ground also contain remnant woodland. The Heritage Lands vegetation has been historically impacted by clearing and erosion during mining, and now has walking tracks and evidence of mining relics.

2.3 PROJECTED GROWTH AND DEVELOPMENT

The Bathurst 2040 Community Strategic Plan (2018) forecasts the future population as 53,361 persons by 2036 (Bathurst Regional Council 2018). The Bathurst Regional Local Environmental Plan (LEP) 2014 identifies urban growth as occurring primarily to the east within Laffing Waters and Kelso. Councils Urban Strategy (2007) identifies long term growth opportunities towards the west (Stewarts Mount), north of Eleven Mile Drive and to a smaller extent around Perthville.

In the east, the urban boundary can be extended to the 730 metre contour while protecting the rural vistas from the city. This contour is also the upper level at which town water can currently be supplied.

Residential development is likely to continue in in Kelso (North), Laffing Waters, Abercrombie, Llanarth, Eglinton, and Windradyne, with 'infill' development in Bathurst (Central) and West Bathurst. Other areas such as Kelso (South), Mitchell, Robin Hill, Mount Panorama, Raglan, South Bathurst, Gormans Hill, White Rock and the remainder rural areas are expected to have lesser growth in dwellings (Council Population and Household Forecasts 2011-2036, 2017).

2.4 CLIMATE

The mean rainfall varies from 572 millimetres (Bradwardine, Bureau of Meteorology (BoM), 2018) to 932 millimetres (Sunny Corner BoM, 2018). Temperatures vary from very warm to hot in summer, to cool to cold in winter in higher lands to the east and southeast. While parts of Bathurst Regional LGA are in a rain shadow, parts of the tableland have higher rainfall. The highest falls occur during the summer period (BoM, 2018).

The vegetation in the Bathurst Regional LGA also has to survive a wide variance in ambient temperature, with minimum temperatures plummeting to as low as minus 9 degrees Celsius and a terrestrial minimum to minus 15 degrees Celsius. Summer temperatures, although averaging in the mid to high twenties, can experience temperatures into the forties.

Frost is another factor which constrains plant growth and species suitability. They have been recorded in every month except February, with May to September recording from 10 to 20 frost days per month.

The climate of New South Wales is changing. Australia's climate has warmed by 0.9°C since 1910, which has been accompanied by a large increase in extreme temperatures. Average temperatures have been steadily rising since the 1960s. Changes in natural hazards are already being observed with heat waves, heavy precipitation and severe bushfire conditions becoming more frequent and more intense (OEH, 2016). The Central West and Orana are expected to experience warming of about 0.7°C in the near future (2020–2039). Temperatures are projected to increase to about 2.1°C in the far future (2060–2079), when spring and summer temperatures will increase by 2.5°C (OEH, 2014). The number of hot days per year with maximum temperatures above 35°C is projected to increase. The average number of cold nights is projected to decrease with 23 fewer cold nights per year (ranging from 17–28 nights across the individual models for the Central West and Orana).

In the Central West and Orana the majority of models agree that spring rainfall will decrease and autumn rainfall will increase in the near future and the far future. An increase in summer rainfall is projected for the far future but changes in the near future are less uniform with drier conditions in the north and wetter conditions in the south.

Increases in severe fire weather are projected in summer and spring. Although these changes are relatively small in magnitude (3.5 additional days per year for the far future) they are projected in prescribed burning periods (spring) and the peak fire risk season (summer).

Climate change is emerging as a serious threat to native species and ecosystems and is expected to be an ongoing challenge to their effective conservation. Rising temperatures and sea levels, as well as climate-induced changes in fire regimes, water quality and ocean chemistry, will have wide-ranging impacts on biodiversity. Existing threats such as habitat loss, weeds, pest animals, fire, storm events and drought will also be intensified. Within the Bathurst Regional LGA there are potentially vulnerable ecosystems including high altitude and fragmented terrestrial ecosystems, and ecosystems in areas vulnerable to fire or with low freshwater availability.

2.5 LANDFORM AND LANDSCAPE

Most of the information relating to the landform and landscape of the Bathurst regional LGA was derived from the *Bathurst and Forbes 1:250,000 Map Sheets* (Chan, 2003), *Bathurst: A City in a Special Landscape* (Marshall, 2016) and *Descriptions for NSW (Mitchell) Landscapes Version 2 and 3.1* (Mitchell 2002, Eco Logical, 2008).

2.5.1 Landform

The Bathurst Regional LGA consists of two physical components, the Bathurst Basin and the surrounding tablelands, which are drained by the Fish, Campbells, Macquarie and Turon Rivers to the north and the Isabella and Abercrombie Rivers to the south.

The Bathurst Basin is a 20 km^2 floodplain at 635m AHD on the Macquarie River. It is surrounded by gently undulating hills and country of higher elevation, with four mountains over 1200m above sea level.

The Great Divide on the eastern edge of the Bathurst Regional LGA separates the coastal drainage to the east from the inland drainage to the west. The Canobolas Divide runs northwest across the Bathurst Regional LGA separating the Macquarie River system from the Darling, and in the southeast of the LGA the Lachlan separates from the Macquarie system, part of the paleodrainage system of the Lachlan Folds.

The Abercrombie Volcanic Province to the south comprised lava fields with multiple outlets that delivered molten basalt in vast flows down the ancient Macquarie River bed, filling their channels and capping sediments.

On the north-eastern border of Bathurst Regional LGA, the landform arises from the Sydney Basin and comprises moderately weathered rises and slightly weathered bedrock mesas that are remnants of a dissected and warped ancient land surface.

2.5.2 Mitchell Landscapes

The upper Macquarie Channels and Floodplains of Bathurst granite has general elevation of 260 to 420m, local relief 5 to 25m. Limited areas of Tertiary basalt occur with buried river gravels along the ridges generally parallel to the main stream. It features narrow floodplain benches with alluvial sands and gravels with minimal soil development. This gives rise to red gradational earths and texture-contrast soils on terraces

The Macquarie Valley Basalts are discontinuous flat-topped peaks and hillcrests on the upper margin of the Macquarie – Turon. It is a gorge landscape with tertiary flow basalts and underlying quartz sand and river gravel of a former Macquarie River. Its general elevation is 700 to 750m, local relief 30m with the subbasaltic sands commonly 200 to 250m above the present river. It gives rise to stony red-brown and yellow brown structured, friable loam.

The Macquarie – Turon Gorges are steep sided, deep gorge tracts with incised meanders of the Macquarie and Turon Rivers below extensive tablelands of the Ophir-Hargraves Plateau landscape. They are incised across the structural grain of north-south trending tightly folded Devonian dacite, crystal tuff, quartzite and slates. Their general elevation is 500 to 700m, local relief to 150m. They give rise to shallow stony soils on semi-stable scree slopes and yellow texture-contrast soils on lower angle slopes.

The Mount Horrible Plateau to the east and north is a dissected plateau with undulating hills and steep wooded ridges in folded Devonian conglomerates, sandstones, and mudstones. There is strong structural control of topography, steep slopes, general elevation of 750 to 1300m, local relief 250m. It gives rise to red gradational well-structured and red texture-contrast soils on crests. There are yellow earths on some sandstone, yellow texture contrast soils with bleached A2 horizons on lower slopes, dark clay loams and clays in broader creek lines. There is strong development of stone layers that may reflect the past climate.

The Rockley Plains feature low rolling hills on a plateau surface with Silurian and Ordovician slate, phyllites, felspathic sandstones and interbedded volcanics. Its general elevation is over 1000m, relief to 150m. Red and yellow texture-contrast soils often with prominent bleached A2 horizons.

The Upper Lachlan Channels feature the upper reaches of the Lachlan River passing through the central western tablelands to the floodplains on the western slopes. The stream pattern cuts across the geologic structure forming several narrow gorge sections with rocky walls and limited deposits of gravel alluvium.

2.6 GEOLOGY AND SOILS

The information on geology and soils of the Bathurst regional LGA was derived from the *Bathurst 1:250,000 Geological Sheet* (Raymond O.L. and Pogson D.J., et al, 1998), the *Soil Landscapes of the Bathurst 1:250,000 Sheet* (Kovac, Murphy and Lawrie 1990).

2.6.1 Geology

The Bathurst basin is a granite erosion basin caved out of a plateau that was raised during the formation of the Great Divide. Its dominant underlying geology is the Bathurst Granite with basalt occurring at Mount Panorama and Mount Stewart.

The valley floors along the Macquarie River through Bathurst City are characterised by moderately fertile alluvium.

To the north near Wattle Flat, Sofala Volcanics occur consisting of volcanic sandstone, conglomerate, breccia, siltstone, cherts, andesite, greywacke and tuff.

To the north west formations of the Hill End Trough feature parent geology of shale, schist, greywacke, conglomerate, slate, phyllite and siltstone.

The geology of the tablelands to the west are represented by volcanic and metamorphic slates, massive quartz sandstones, siltstones, lithic sandstones dissected by numerous north south fault lines.

The south is more complex geology with siltstones, sandstones, greywacke, shales and chert, basalt and granite intrusions and embedded volcanic and limestones. The geology features grey and black slate, feldspathic and quartz greywacke, conglomerate, rhyolite, tuff, limestone and shale.

Cave and karst areas include Abercrombie Caves, south of Trunkey Creek, and the Benglen Caves on the Jesse Limestone at Limekilns.

2.6.2 Soil Landscapes

a) Bathurst

Non-Calcic Brown Soils

These are the dominant soils of Bathurst and occur on slopes of undulating to rolling hills on the Bathurst Granite. Topsoils range from sandy loam to loam.

They have a moderate water holding capacity, are pH neutral, have moderate chemical fertility and have a moderate erosion hazard.

Main soil constraints: The topsoils are often weakly structured and are prone to hardsetting. Nitrogen, phosphorous and molybdenum are nutrients known to be deficient in these soils.

Yellow Solodic Soils

These soils are commonly found on lower slopes and in imperfectly to poorly drained depressions. Topsoils are mainly sandy loams to fine sandy loams, with some fine sandy clay loams to loams. The subsoils are light sandy clays to sandy clay loams. Gullies with depths often greater than three metres are associated with these soils. The pH of these soils ranges from neutral to alkaline.

Main soil constraints: The topsoils are prone to hardsetting, resist wetting when dry and the subsoils often restrict infiltration, resulting in poor drainage.

The erodibility of the subsoil is particularly high and is susceptible to all forms of water erosion.

The overall chemical fertility of the soils is low and deficient in nitrogen, phosphorous, molybdenum as well as calcium. Ameliorating with calcium in the form of gypsum or calcium carbonate will improve the physical structure of the soils. Avoiding the application of lime is necessary to prevent an increase in pH.

Red Solodic Soils

Red solodic soils are the dominant soil type on the upper and mid slopes of the Bathurst Plains to the east and north of Raglan and to the north of Perthville. They have a high water holding capacity and can range in pH from neutral to slightly alkaline.

The topsoils are mainly sandy loam with some loamy sands and loams. The subsoils range from sandy clay loams to heavy clay loams.

Main soil constraints: The topsoils are prone to hardsetting and have low chemical fertility, being particularly deficient in nitrogen and phosphorous.

b) Panorama

This soil landscape occurs at Mount Panorama and Mount Stewart and is dominated by the krasnozems soil type. In contrast to the Bathurst Granite underlying the other soil

landscapes in the Bathurst regional LGA, the Panorama soil landscape is underlain with basalt.

Krasnozems

The krasnozems are well-drained soils, have a high water holding capacity and are moderately fertile. The soils have low erodibility, though the erosion hazard is moderate due to the degree of slope.

Topsoils are friable loams to clay loams with clay loam to light clay subsoils. The soils are moderately fertile and are acidic.

c) Macquarie

The landform features of the Macquarie River include alluvial plains and terraces with local relief often less than 10 metres. Other elements include backplains, swamps, channel benches, relict stream channels, floodouts, ox-bow, levees and point bars.

Prarie Soils

Prairie soils are the dominant soils on the alluvial plains of the Macquarie River. They have black, moderately well-structured loam to clay loam topsoils. The subsoils have alkaline light to medium clays. Water holding capacities are excellent.

Problems with drainage occur in Bathurst where natural levees cause a bank-up of water during floods.

d) Wattle Flat

These occur on the undulating low hills near Wattle Flat and north-east of Sofala. Red podzolic soils in the upper to midslopes are the dominant soils.

Red Podzolic Soils

The topsoil is a dark reddish brown to brown loam to loam fine sandy with weak structure and is slightly acid. The subsoil has a clear to sharp change to reddish brown medium clay with moderate to strong structure, dense peds, and is strongly acidic. They are well drained to moderately well drained and have moderate permeability. They have moderate fertility.

Main soil constraints: soils are hardsetting on the surface. They have known nutrient deficiencies of nitrogen and phosphorous. They have a high structural degradation hazard with moderate to high topsoil erodibility and there is minor sheet erosion on cleared land.

e) Sofala

This soil landscape comprises parts of the Turon River catchment near Sofala. Rolling low hills and hills occur. The Turon River is a slowly migrating, deeply incised channel. Red podzolic soils are dominant.

Main soil constraints: minor sheet erosion with some areas of severe sheet and gully erosion in the drainage lines.

f) Sunny Corner

This soil landscape covers a large area around Sunny Corner, extending from Kirkconnell to the Mount Lambie area and Dark Corner in the north. It features undulating to rolling low hills, with red earths and yellow podzolic soils on sideslopes. Yellow earths occur in lower slopes, with yellow solodic / podzolic soils in drainage lines. Structured loams and small areas of lithosols occur on crests of higher areas. Red podzolic soils are found on upper slopes.

Red Earths

The topsoil of brown to dark brown silt or fine sandy loam, or light sandy clay loam which is massive or has weak structure and is slightly acidic; overlying clays that are either strongly or moderately acidic. They have low fertility with known nutrient deficiencies of nitrogen and phosphorous. Soil salinity is low.

Main soil constraints: soils have a high structural degradation hazard with moderate erodibility and there is some sheet erosion if cleared.

g) Trunkey Creek

The Trunkey Creek landscape comprises the rolling hills around Trunkey and extending south. Yellow podzolic soils and red podzolic soils are both common. Yellow podzolic soils occur on less well drained southern slopes, and red podzolic soils are common on the better-drained northern slopes. Profiles are typically stony with quartz-strewn surfaces

The yellow and red podzolic soils have low fertility with known nutrient deficiencies of nitrogen and phosphorous. The soils have a low salinity and are moderately to slightly acidic.

Main soil constraints: the podzolics have a high structural degradation hazard, high erosion hazard, and moderate gully erosion. Yellow soloths and solodic in the drainage depressions are strongly acidic, have low fertility with known nutrient deficiencies of nitrogen and phosphorous, moderate to high soil salinity, high erodibility, high erosion hazard, high structural hazards and prone to moderate to severe gullying.

h) Raglan

The Raglan landscape comprises the gently undulating to undulating rises on the Bathurst Plains. Red solodic sols are the dominant soils. Topsoils are reddish or dark brown sandy loam to loam with weak structure, and at 30cm there is a clear change to brown (sometimes bleached) sandy loam with weak structure, overlying clay subsoils. The soil pH is slightly acidic to weakly alkaline. Soil fertility is low with known deficiencies of nitrogen and phosphorous.

Main soil constraints: soils are hardsetting, with yellow solodics on lower slopes. The drainage depressions have poor drainage with topsoils and subsoils that have high erodibility, moderate salinity, and gully erosion of greater than three metres occurring.

i) Mookerawa

The Mookerawa landscape includes the rolling low hills to rolling hills from north and east of Bathurst, in the vicinity of Peel and Napoleon Reef, and across to Hill End and the Macquarie River.

The dominant soils are yellow soloths on lower slopes and in drainage depressions and red podzolic soils on crests and upper slopes. The topsoil of the yellow soloths is a dark brown, brown or dull yellowish brown sandy loam, through to loam to sandy loam with a weak structure. It is very strongly acidic to neutral.

Main soil constraints: severe gullying and tunnelling of the yellow soloths; yellow solodic soils with alkaline soil reaction trends also occur. Red podzolics are subject to sheet erosion when cleared of native vegetation. They have mainly hardsetting soils. Drainage depressions and lower slopes have moderate to high soil salinity, with moderate to high erodibility of the topsoil and subsoil.

j) Mullion Creek

The Mullion Creek landscape includes the undulating low hills that occur north of Bathurst in the Peel and Napoleon Reef areas with red podzolic soils on higher crests and yellow soloths on lower slopes and in drainage lines.

Topsoils are dominated by dark reddish brown loam that are fine and sandy with a weak structure, overlying clays. The soil pH is moderately acidic.

Main soil constraints: the topsoil is susceptible to gully erosion on the crests with the lower slopes and drainage lines with moderate to severe gullying, dispersible soils that are difficult to revegetate. In the lower slopes and drainage depressions soil salinity is moderate to high and topsoil and subsoil have moderate to high erodibility, with moderate erodibility on the crests.

2.7 SALINITY AND HIGH WATER-TABLES

Before the land was cleared, native trees, shrubs and perennial grasses used much of the available moisture in the soil. Water not used in the wetter periods filtered into the groundwater system. With the loss of this vegetation, the amount of water recharging the groundwater system increased. The consequent rise in the watertable can mobilise salt stored at depth in the soil profile, at times concentrating them at the surface by evaporation.

The occurrence of dryland salinity is determined by a number of characteristics of the local catchment, namely the geology, the shape of the catchment including bedrock shape, climatic conditions, soil types, farming practices and vegetation cover (Salt Action n.d.).

The impact of dryland salinity includes reduced plant vigour, a change of vegetation species, death of non-salt tolerant native plants and crops and the development of bare patches or salt scalds. Urban salinity can also affect vegetation, damage buildings, roads, bridges, pipe systems and other infrastructure.

Management of vegetation to control groundwater recharge across the whole catchment and throughout the year generally provides the main practical method for controlling dryland salinity (Salt Action n.d.).

Urban salinity impacts are evident throughout the urban area of Bathurst City, with a strong concentration within the central business district area. Damage to brickwork, walls, foundations and other infrastructure is readily visible (NSW Department of Environment Climate Change and Water 2011).

Rural hydrogeological landscapes within the Bathurst Regional LGA that have been identified with a very high salinity hazard include Sallys Flat, Trunkey, Triangle Creek, Oberon and Gilmandyke. High Hazard landscapes include Glanmire, Oberon Basalt, Macquarie Alluvium, The Lagoon, and Ben Chifley (NSW Department of Environment Climate Change and Water 2011).

A salinity audit of the upland catchments of the NSW Murray-Darling Basin (Department of Environment and Climate Change, 2009) defined current status and future trends in dryland salinity.

Table 1 Land area salinized for each valley (DECC)

Valley	**Salt outbreaks (ha)**
Border Rivers	158
Gwydir	1,575
Namoi	1,326
Lachlan	22,153
Macquarie	18,599
Murrumbidgee	18,222
Murray	379

Land area salinized for each valley has been summarised in Table 2, which indicates that the Macquarie Valley has the second highest area of salt outbreaks.

Table 2 Area of salt outbreaks in subcatchments

Subcatchment	**Salt outbreaks (ha)**	**% area of salt outbreaks**
Macquarie residual 4	2263	1.49
Macquarie residual 7	3368	1.19
Macquarie residual 3	3190	1.02
Crudine River at Turon River junction	275	0.79
Green Valley Creek at Hill End	57	0.49
Queen Charlottes Creek at Georges Plains	54	0.27
Abercrombie River at Abercrombie	503	0.19
Macquarie residual 1	153	0.15
Macquarie Residual 2	85	0.08
Winburndale Rivulet at Howards Bridge	60	0.08
Fish River at Tarana	28	0.05
Turon River at Sofala	24	0.03

Table 3 is an excerpt of salt outbreak mapping ranked by subcatchments, showing the highest ranked areas within the Macquarie valley.

Salt export and stream salinity concentrations were found to be medium to high at Crudine River, with medium salt export and medium to high at Campbells River, medium salt export and stream salinity at Turon River and Winburndale Rivulet. Queen Charlotte Creek had low to medium salt export and medium stream salinity, while low to medium salt export and stream salinity was found at Abercrombie River. Low to medium salt export and low

stream salinity was found at Fish River, Turon River at Sofala, Winburndale Rivulet, Fish River at Tarana, and both low salt export and low stream salinity at Abercrombie River, Abercrombie.

DECC (2009) found a general pattern of increasing salinity trends in the Macquarie catchments.

Table 3 Predicted increase in salinity (DECC, 2009)

Predicted Increase in Salt Loads	**2020**	**2050**	**2100**
Border Rivers	0.62	1.131	1.85
Gwydir	4.39	6.46	8..62
Namoi Peel	1.46	2.22	3.43
Macquarie	2.33	2.88	3.50
Lachlan	1.11	1.81	2.79
Murrumbidgee	0.32	0.53	0.85

A salinity hazard mapping project based on hydrogeological landscapes, was completed in 2010-11 by the NSW Office of Environment and Heritage (OEH, 2011). It mapped the occurrence, extent and susceptibility of salinity processes and impacts in the Bathurst Regional LGA including rural landscapes, the urban area and in the wider Chifley Dam catchment. This data is used for determining appropriate salinity prevention and management actions in the various landscape types identified.

3 VEGETATION MANAGEMENT PLAN PROCESS

3.1 INTRODUCTION

The VMP focuses on land owned and controlled by Council and also covers areas outside these bounds due to the interaction of natural process beyond property boundaries. Therefore vegetation management becomes a collaboration between many stakeholders within and neighbouring the Bathurst Regional LGA.

The process involved in developing the VMP used generic principles of extensive community consultation, reviewing relevant literature and undertaking on-ground assessments.

This section outlines these procedures.

3.2 GUIDING PRINCIPLES

The fundamental principles guiding the direction of the VMP are:

- The VMP has to be adaptive, relevant, effective, achievable and targeted to allow for an implementation process and its long-term applicability;
- The objectives, strategies and recommendations of the VMP will be consistent with the regulatory frameworks that guide all aspects of planning and vegetation and natural resource management in the Bathurst Regional LGA;
- Include extensive consultation with Council, relevant government agencies, non-government organisations, key stakeholders and the community;
- The VMP complies with the principles of Ecologically Sustainable Development to ensure the effective integration of economic and environmental considerations in decision-making processes. The ecologically sustainable development principles relate to the VMP on levels of:
  - Prevention of environmental degradation;
  - Maintenance or enhancement of the health, diversity and productivity of the environment for future generations;
  - Conservation of biodiversity;
  - Environmental factors should be included in the valuation of assets and services;
- The VMP is to recognise the bio-physical, social and cultural constraints on, and opportunities for vegetation management in the Bathurst Regional LGA;
- For strategic vegetation management and planning, the VMP recognises vegetation and other natural resource issues beyond land owned and controlled by Council; and
- The VMP will recognise and incorporate, where necessary, relevant outcomes identified during the literature review.

3.3 PLAN PROCESS

The process of developing and implementing the updated VMP is described below.

3.3.1 Planning Controls

There are a number of regulatory controls, relevant legislation, strategies and policies that govern and guide the direction of the VMP. These are addressed in Section 4.

3.3.2 Literature Review

A literature review for the update of the VMP included documents relating to the cultural, historical and environment aspects of the Bathurst Regional LGA. Relevant objectives, issues or recommendations derived from each document were identified and used to develop or update management objectives, strategies and recommendations.

The issues and recommendations were fundamental in developing the new VMP as they represent community attitudes and concerns, are the result of previous technical

studies, and identify constraints and opportunities for vegetation management.

3.3.3 Community Consultation

Community consultation has been an integral part in the development of the updated VMP from the onset to the final stages.

The consultation included government agencies, key stakeholders, community groups, and non-government organisations. The consultation process has given a collective response to the vegetation status in Bathurst Regional LGA and has been fundamental in developing a common vision and in determining values, issues, targets and directions for management. Further details on the consultation process are outlined in Appendix A.

3.3.4 Development of Strategies and Recommendations

The update of the VMP followed the process for development of strategies and recommendations used with the development of the original plan. The starting point was from the principles that were to guide the Plan as well as planning initiatives and community input. From that standpoint, visions, values, and issues and threats were identified to assist with the setting of management objectives.

The management objectives are grouped into a number of management categories, covering significant natural landscapes, native remnant vegetation, waterways, the streetscape, parks and public reserves, gateways and the floodplains and wetlands.

To meet the objectives, a number of strategies and recommendations were developed with appropriate community, stakeholder and government agency consultation.

Actions were given an 'importance' ranking from 1 to 4, with 1 being the highest. This endeavours to support the long-term goal of managing the Bathurst Region's vegetation resource well into the future, and to manage the strategies within the constraints of available funds and other resources. Actions have been ranked with consideration given to a number of criteria, such as:

- Risk of threat (i.e. implementation needs to be undertaken on the basis that if works do not proceed in the short-term, then undesirable outcomes may result, costs may escalate at a later date, public safety is at risk or opportunities may be lost);
- Benefit to cost ratio;
- Value of outcome;
- Community sentiment; and
- Conservation/heritage value (the greater the value the greater the importance).

In all, the expanded Plan encompasses a set of objectives, strategies and recommendations that provides direction for vegetation management within Bathurst Regional LGA.

3.3.5 Plan Implementation

To date, significant achievements have been made based on the original VMP. These are recognised and documented in Appendix B.

The VMP has been and will continue to be implemented through the adoption of guidelines and recommendations contained in the Plan.

Some of the identified strategies within the VMP may become projects that require further development which is beyond the scope of this VMP. When these new projects are formulated they are to also consider best practice guidelines at the time. Council and relevant organisations will prepare additional management plans or implementation plans to detail actions before projects commence. In these instances, the VMP still underpins and provides the basis and direction for vegetation management in the Bathurst Regional LGA.

Where required on specific projects, further consultation will occur with relevant stakeholders such as the Office of Environment and Heritage and the Bathurst Region Natural Resource Advisory Group.

Implementing the VMP is dynamic, with a periodic monitoring and review process in place to ensure the Plan has relevance in the

future. More detail on this process is given in Section 13

4 REGULATION, COMPLIANCE AND PLANNING PRINCIPLES

4.1 INTRODUCTION

The Plan, for successful implementation, has to be consistent with existing Commonwealth, State and local statutory and policy framework. This section outlines the relevant legislation and planning policies governing the VMP.

It is to be noted that the list of planning initiatives is not comprehensive and many of the plans, policies, strategies and legislation have specific life-spans or change over time.

4.2 LOCAL COUNCIL RESPONSIBILITIES

Council plays an important and integral role in natural resource management within its LGA.

4.2.1 Local Government Act 1993

Council's responsibilities for natural resource management are clearly defined in Section 8 of the *Local Government Act 1993* (LG Act) to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible.

Through Section 36 of the LG Act Council is required to prepare plans of management for community land. Both the Act and Regulations require Council to manage vegetation within these lands according to legislated objectives.

Likewise through the *Environmental Planning and Assessment Act 1979* (EP&A Act), Council's responsibilities are further reinforced with the following objectives:

- To encourage the proper management, development and conservation of natural and man-made resources; and
- To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.

Council, under the EP&A Act and through the LEP and Development Control Plans and Local Policies, plays an important role as the consent authority for development. Council is responsible for assessing and determining development proposals having regard to relevant legislation and the impacts development may have upon natural resources.

The VMP will assist Council in its charter and responsibilities relating to the environment by providing a source of information that will allow strategies and policies to be adopted so that balanced decisions can be made in relation to vegetation management.

4.2.2 Biodiversity Conservation Act 2016 and Regulation 2017

Council is the consent authority for development approvals under Part 4 of the EP&A Act 1979. This applies to the VMP where development affects land under Council's care, control and management with native vegetation present. Under Part 7 of the *Biodiversity Conservation Regulation* (BC Regulation) 2017 a development that triggers the Biodiversity Offset Scheme (BOS) threshold requires Biodiversity Assessment Method (BAM) where:

- It is likely to significantly affect threatened species, ecological communities or their habitats according to the Assessment of Significance in section 7.3 of the *Biodiversity Conservation Act 2016* (BC Act); or
- Biodiversity impacts exceed the threshold (map or area)
    - Area trigger – specifies the maximum area of proposed clearing at which the offset scheme applies (Table 4); and/or
    - Map trigger - development that occurs in areas containing sensitive biodiversity values mapped on the Biodiversity Values Map.

Table 4: Trigger clearing sizes for landholdings under Biodiversity Conservation Regulation 2017

Minimum Lot Size of Property	Area of Vegetation Clearing
≤ 1hectare	0.25 hectares
1ha - ≤ 40 hectares	0.5 hectares
40 – 999 hectares	1.0 hectare
≥ 1,000 hectares	2 hectares

For a local development where the BOS and BAM is triggered, a Biodiversity Development Assessment Report (BDAR) is submitted with the development application (DA). If Council considers that there is Serious and Irreversible Impact on biodiversity values under Section 6.5 of the BC Act that would remain on biodiversity values after the measures proposed to be taken to avoid or minimise the impact of the proposed clearing, then Council must refuse the DA.

All State Significant Development and State Significant Infrastructure on Council land require a Bidiversity Development Assessment Report (BDAR) unless the proposed development activity is unlikely to have a 'significant impact' on any Threatened species, Threatened Populations or Endangered Ecological Communities listed under the BC Act or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Under a Part 5 approval for activities on Council land, authorities undertake a Review of Environmental Factors and can choose to undertake an assessment of significance or a BOS.

If development consent is not required for clearing of native vegetation, there are two approval pathways for clearing:

- If land is in an urban area or certain zones defined under the Vegetation State Environmental Planning Policy (SEPP), and clearing exceeds the BOS threshold, it requires approval by the Native Vegetation Panel (NVP) or a Council as its delegate under the Vegetation SEPP using a BAM assessment. As well as considerations set out in the Local Land Services Act 2013 (LLS Act), the NVP or Council delegate considers any biodiversity, heritage or amenity considerations set out in an applicable DCP;
- If land is mapped in by the Native Vegetation Regulatory Map under the LLS Act, clearing requires a BAM assessment and approval by the Native Vegetation Panel (NVP) established under the LLS Act; this clearing is usually associated with extensive agriculture, which can be carried out without development consent in all rural use zones. The NVP must impose a biodiversity offset as part of any approval issued for the clearing of land identified by the Native Vegetation Regulatory Map. The NVP will not delegate its functions to Councils in relation to approvals for clearing of vegetation on land identified on the Native Vegetation Regulatory Map;
- In some cases there may be statutory exemption to the proposed clearing or clearing may be allowed under a clearing Code made under the LLS Act; and
- Clearing below the BAM threshold that does not require development consent is regulated by local councils under the DCP that applies to the relevant land.

Council may enter into private land conservation agreements including biodiversity stewardship agreements, conservation agreements and wildlife refuge agreements under Part 5 of the BC Regulation 2017. This is described more fully in Section 13 of the VMP. Part 6 of the BC Regulation sets out a number of rules including additional biodiversity impacts to which offsets apply, rules for the biodiversity offsets scheme, the content of assessment reports (for development, certification and stewardship sites), credits. Part 8 outlines the biodiversity certification of land.

4.2.3 Bathurst Regional Local Environmental Plan (LEP) 2014

Within the Bathurst Regional LEP 2014 there are a number of aims objectives that protect or enhance vegetation in the LGA. These are:

1.2 Aims of Plan

(2)(d) to identify, protect, enhance and manage areas of high biodiversity conservation value as a means to:

(i) preserve and improve the ecosystem services they provide, and

(ii) protect the region's significant vegetation and scenic quality, and

(iii) respond to and plan for climate change by identifying and protecting habitat corridors and links through the local government area,

(2)(l) to protect and enhance the region's landscapes, views, vistas and open spaces.

Land Use Table

Zone RU1 Primary Production

Objectives of Zone

- To maintain the rural and scenic character of the land; and
- To provide for a range of compatible land uses that are in keeping with the rural character of the locality, do not unnecessarily convert rural land resources to non-agricultural land uses, minimise impacts on the environmental qualities of the land and avoid land use conflicts.

Zone RU2 Rural Landscape

Objectives of Zone

- To maintain the rural landscape character of the land.

Zone E2 Environmental Conservation

Objectives of Zone

- To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.

Zone E4 Environmental Living

Objectives of Zone

- To provide for low-impact residential development in areas with special ecological, scientific or aesthetic values.

3.3 Environmentally sensitive areas excluded

(1) Exempt or complying development must not be carried out on any environmentally sensitive area for exempt or complying development.

5.10 Heritage conservation

Objective

(a) to conserve the environmental heritage of Bathurst Regional local government area.

4.2.4 Bathurst Regional Development Control Plan (DCP) 2014

The Bathurst Regional DCP 2014 contains detailed planning and design guidelines for new development.

The DCP Landscaping and Greening Chapter has the strategic objectives to:

a) protect, enhance and adequately manage areas of high terrestrial and aquatic biodiversity conservation value.

b) promote the restoration of lost biodiversity.

c) plan for the protection and enhancement of the Sawpit Creek and Raglan Creek corridors by requiring their rehabilitation and enhancement.

The DCP contains controls that relate to the preservation of trees that occur within Heritage Conservation Areas, relating to Clause 5.10 Heritage Conservation (note that Clause 5.9 Preservation of trees or vegetation has been repealed).

The DCP contains objectives and controls for Landscape Plans to be prepared with the following objectives:

a) To improve the visual amenity and to ensure that developments do not dominate their surroundings.

b) To provide an environment which enhances the streetscape and the surrounding neighbourhood.

c) To provide an attractive outdoor living area.

d) To provide landscaped buffers to reduce the potential for conflict between land uses.

The DCP contains design principles for landscaping for different types of development. That are to be observed in addition to the requirements of the VMP.

A Landscape Plan must be prepared for the following types of development:

i) Residential Units, involving more than 10 dwellings.

ii) Business Development for sites which adjoin a major road or highway.

iii) Industrial Development for sites which adjoin a major road or highway.

iv) Subdivision of land which incorporates any of the following land management areas: Agricultural Interface Areas, Land Use buffers, Major Road buffers, Open space, Environmental Protection Areas, Outer riparian corridor, Top of Raglan Creek bank and Vegetation Screens as identified on any relevant DCP map.

v) Subdivision of land which creates or adjoins an arterial or sub-arterial road for which direct access to private properties will not be granted.

vi) Subdivision of land which adjoins or encloses a designated waterway or water body.

vii) Subdivision of land which may impact upon the natural movements of protected or threatened flora and fauna species in the area.

viii) Any other development that in the opinion of Council requires specific ongoing monitoring of landscape maintenance.

The DCP contains controls relating to the provision of street trees with one of the relevant objectives being to:

- A) Improve the visual quality and amenity of new subdivisions.

4.2.5 Codes and Contributions Plan

Council also has a Landscaping Code outlining requirements for new landscaping to be provided to certain developments. In addition to this code, Council imposes conditions on new subdivision consents for monetary contributions for new street trees.

4.2.6 State Environmental Planning Policy 44 - Koala Habitat Protection

Bathurst Regional LGA is listed in Schedule 1 of the *State Environmental Planning Policy (SEPP) No. 44 – "Koala Habitat Protection"* and is within the known geographic distribution of koalas in NSW.

This requires the investigation of whether the vegetation forms potential koala habitat, and if so, whether it is core koala habitat when undertaking a development or activity or planning proposal (rezoning).

Council may also prepare a Comprehensive Koala Plan of Management for the Bathurst Regional LGA.

4.2.7 Central Tablelands Local Strategic Plan 2016-2021

Local Land Services (LLS) was established to provide primary production advice, biosecurity, natural resource management and emergency management. The Central Tablelands LLS covers the Bathurst Region and other LGAs. It prepared the Central Tablelands Local Strategic Plan 2016-2021 (LLS 2016) which operates under the State Strategic Plan.

Regional priority issues include themes of:

- Community adaptive capacity;
- Aboriginal cultural heritage;
- Agricultural viability;
- Native vegetation;
- Threatened species; and
- Waterways, swamps and groundwater.

Relevant regional strategies for the VMP are:

- S2.2 Improvements in soil health, biodiversity, vegetation and water quality across the landscape;
- S2.3 Weeds and pest animal impact minimised; and
- S3.3 Weeds and pest animal impact reduced.

The Central Tablelands Local Strategic Plan links the local contribution to state-wide goals and strategies that have been designed to

deliver the vision of the LLS, with the most relevant to the VMP being Goal 3.

Goal 3: Healthy, diverse and connected natural environments. Investment priorities to address regional issues and thresholds under Goal 3 are:

- ***Native Vegetation*** – Vegetation removal, fragmentation, total grazing pressures, changes to natural fire regimes, clearing, invasive species, farming and fertiliser use, and hydrological regime changes. Thresholds are Native vegetation extent maintained above 30%, vegetation connectivity –10ha patch every 1.5km and paddock tree spacing < 100m;
- ***Threatened Species*** – Habitat loss or degradation-disconnection, predation, competition from pest species. Threshold are reduction in key threatening process (fire regime, fragmentation, habitat clearing, pest plant and animals); and
- ***Waterways, Swamps and Groundwater*** – Riverine/wetland vegetation condition, bed and bank stability/disturbance, soil condition, point source pollution, flow regime changes, loss of terrestrial and aquatic habitat, invasive species, sediment and nutrient/pollution input, saline soils. Thresholds are water quality within ANZECC guidelines, Groundcover >75% (75% water erosion threshold; 50% wind erosion threshold), No. of instances of land being used within capability.

Under Goal 3 the identified regional priorities driving regional actions are:

- Pr3.1 Landscape connectivity and habitat fragmentation;
- Pr3.2 Extent and condition of threatened species and habitat that supports the viability of threatened species;
- Pr3.3 Water quality and flow regime management – sediment, nutrient;
- Pr3.4 Aquatic and terrestrial ecosystem interactions – priority reaches;
- Pr3.5 Soil health management and erosion prevention;
- Pr3.6 Impacts of landuse on natural systems – groundcover, vegetation;
- Pr3.7 Pest animal and weed impacts on natural ecosystems;
- Pr3.8 Landuse practices driven by landscape characteristics and capabilities; and
- Pr3.9 Community awareness of, and involvement in, the management of key threatening processes.

4.2.8 Central West and Orana Regional Plan 2036

The Central West and Orana Regional Plan 2036 was prepared by the Department of Planning and Environment in 2017 to promote economic development whilst recognising the natural environment. Goal 2 of this document is for 'A stronger, healthier environment and diverse heritage' which includes key directions and detailed actions that are relevant to the VMP:

- Direction 13: to protect and manage environmental assets;
- Direction 14: manage and conserve water resources for the environment;
- Direction 15: increase resilience to natural hazards and climate change;
- Direction 16: respect and protect Aboriginal heritage assets; and
- Direction 17: conserve and adaptively re-use heritage assets.

5 PART B: VEGETATION THEMES AND MANAGEMENT CATEGORIES

5.1 VISION STATEMENT

Bathurst Regional LGA's reputation as a pleasant and prosperous place to live and do business is enhanced by its community's recognition as a place of excellence in vegetation management.

Through active and collaborative Council leadership in high quality vegetation management, the region will retain the character of its heritage core and villages, its rural setting and outlook, as well as providing for pleasant and sheltered suburbs. The streetscapes, parks, gardens and recreational areas will be reflective of a well-treed city and rural villages with the vegetation functioning to enhance the microclimate and visual appeal. Approaches to the city and key villages will be marked by distinctive gateway vegetation themes.

Substantial areas of native woodlands on the hills throughout the region will be supported by healthy ecological processes and retain a varied and valued sample of native fauna. They will be linked to the Macquarie, Fish, Campbell, Turon and Abercrombie Rivers and their tributaries by a web of corridors based on streamlines, cycleways and roadsides and other corridors. The Macquarie River will be a focus of community pride in a setting provided for by the restoration of the native riparian vegetation, as well as providing park and garden amenity needs of the community in selected parks. The other river reaches throughout the region will be rehabilitated and enjoyed for their aesthetic and riparian values where Council is the land manager.

5.2 VEGETATION THEMES AND MANAGEMENT CATEGORIES

Vegetation themes paint a broad descriptive picture of the types of vegetation to be represented in a given area, while management categories target a key number of physical land areas for strategic management.

In developing planting themes, it was observed that the Bathurst Regional LGA has a varying landscape moulded from natural features, past Aboriginal fire regimes, and other significant elements developed and evolved since European settlement. In combination with these factors, the region presents an overall rural identity with a strong cultural heritage foundation. Within its unique identity there lie areas of specific character, each being integral to the landscape. These areas have 'signature' characteristics enabling them to be put into certain themes.

The value of themes is to create a sense of unity, harmony, character and a sense of transition from one landscape to another. Themes also retain and protect cultural, heritage and environment values. The designated themes for the VMP are listed below:

- Heritage Conservation Area;
- Endemic Native Vegetation;
- Native Vegetation;
- Exotic/Native Mix;
- Natives Dominant;
- Exotics Dominant;
- Waterways; and
- Floodplains and Wetlands.

Management categories are key areas differentiated by land use or function that require specific consideration and management. The purpose of vegetation categories is to provide detailed management procedures on how best to care for, maintain and enhance the vegetation type that exists within any particular area.

In addition to the management procedures, each vegetation category identifies key

strategies and recommended actions as examples on how best to fulfil the overall goals of the VMP.

The designated management categories for the VMP are listed below:

- Significant Natural Landscapes (Section 6);
- Native Remnant Vegetation (Section 7);
- Waterways (Section 8);
- Streetscapes (Section 9);
- Parks and Public Reserves (Section 10);
- Gateways (Section 11); and
- Floodplains and Wetlands (Section 12).

5.3 THEME CONSIDERATIONS

Areas were classified into themes according to a set of criteria based on visual amenity, views, existing natural and built environment, site analysis, land use, culture and heritage, planning provisions, biophysical constraints, social expectations and environmental and ecological aspects. Specific points considered when making the determination are given below:

- The need to protect the landscape value of the ridges and prominent hills around the land systems of the Bathurst Regional LGA;
- The interface between the urban, village and rural landscapes;
- The visual appeal of Bathurst City as it is approached from the major access roads;
- The rural setting and aesthetic appeal of the historic villages throughout the region;
- Preservation of rural vistas viewed from within the City;
- Protect and promote the scenic value, views and vistas within the rural landscapes;
- The character of the existing natural and built environment based on the vegetation type, style of buildings, road layout and land use, etc;
- Slope, topography, solar access and the living environment;
- Land use zones;
- Floodplains and flood regimes, natural wetlands, soil types, drainage;
- Cultural heritage;
- Water quality and landscape protection through watercourse and vegetation management; and
- Habitat protection.

MAP REFERENCE

Map A — Vegetation Themes

5.4 THEME TYPES

5.4.1 Heritage Conservation Areas

a) Characteristics

The vegetation in the Heritage Conservation Areas (HCAs) complements the cultural history of the area and is of an era that typifies early settlement in the Bathurst Regional LGA. It is essentially exotic with autumn colours being a feature in the valley bound city, most notably in the main streets of Bathurst and the historic villages of Rockley, Perthville and Hill End.

b) Theme Areas

This theme covers the HCAs of the Bathurst Regional LGA as indicated in Map A, and includes the Bathurst/West Bathurst Conservation Area, Kelso and the villages of Rockley, Perthville, Hill End, Sofala, Peel, and Wattle Flat, as these are listed under Schedule 5 of the Bathurst Regional LEP 2014. Hill End is also listed under the NSW Heritage Act and as a Historic Site being managed under the National Parks and Wildlife Act. It also covers the memorial gateway planting at Tarana.

The Bathurst HCA encompasses all of the CBD and extends in the north to include the Bathurst Base Hospital, to the west bordering the Agricultural Research Station and Charles Sturt University, the south-west including St Stanislaus College then borders the railway line to the Macquarie River. The HCA runs along the Great Western Highway to Kelso and loops back to include the river up to the Hereford Street Bridge. The streets in the HCA conform to the grid pattern laid out by James Byrne Richards.

Evans Plains HCA occurs around Stewart Street, the once main-street, and includes a number of significant listed items from the 19th century fronting the historic section of unsealed road.

Hill End HCA covers the majority of the village, a place of national cultural significance, set along a gold bearing quartz seam within the tablelands landscape of rolling hills. The HCA features buildings, relics and landscape elements from the 1870s goldrush era.

The Kelso Heritage HCA covers the historically significant area of Lee and Gilmour Streets and part of Sydney Road and features 19th century buildings that were part of Bathurst's first free settlement in the era of prosperity of gold rushes and pastoralism.

Peel Village HCA covers the older part of Peel bounded in the north by Clear Creek, in the west by Church Street and includes Dempsey and part of East Street. The HCA protects the area that saw gold rushes of both the 1850's and the 1870's.

Perthville Village HCA covers the area of Bathurst, Perth, Bridge and Rockley Streets and includes significant blue stone buildings, and the historic bridge. It also covers the Vale Road avenue of Elm trees.

Rockley Village HCA protects the 19th century village near Peppers and Sewells Creeks, in the area bounded by Church Street to Burraga Road, Long, Market and East Streets. The picturesque village features many large mature Elm trees in the park and Hill Street that complement the heritage buildings. The village is listed by the National Trust as one of the oldest settlements west of the Blue Mountains.

Sofala Village HCA protects the significant and historically important village on the riverbank in the floor of a steep sided valley. It extends east and west of the village covering the riparian vegetation of the Turon River and features an informal layout of narrow roads without kerbs and buildings reminiscent of the mid-Victorian period. The village was the centre of a major NSW goldfield in the 1850s and early 1860s.

Trunkey Creek HCA covers the small distinctive historic village of settlers cottages located along the Trunkey Creek valley bounded by Arthur, Lowe, Church and Lloyd Streets.

Wattle Flat HCA covers part of Sofala Road near Limekilns and Thompsons Roads near the Wattle Flat Heritage Lands. The HCA protects an important village where gold was discovered in 1851. Named for its wattle trees, it accommodated thousands of people, and still features remnant mines with very deep shafts.

5.4.2 Endemic Native Vegetation

a) Characteristics

The predominant vegetation type is the endemic native vegetation, whether in the upper storey, shrub layer or groundcover layer. Mostly the upper storey layer would be characterised by Box Gum Woodlands. A dominance of groundcover species may occur in drainage lines, wetlands or grassy plains.

Native trees, shrubs, grasses and groundcovers, particularly those endemic to the area are recommended to be planted in this theme type, with undesirable plant species avoided (Refer Appendix D Species Lists).

b) Theme Areas

This theme covers areas where there is existing remnant vegetation such as around Mount Panorama, Boundary Road Reserve and Brooke Moore Reserve. It also covers areas of remnant vegetation around parts of villages of Peel and Wattle Flat, as well as Napoleon Reef, Meadow Flat and Yetholme. It is to be the representative theme type along rural road reserves as detailed within the Roadside Vegetation Management Plan.

Rural areas are also typified by this vegetation theme with large areas of native vegetation on the steeper slopes.

5.4.3 Native Vegetation

Characteristics

The predominant vegetation type in this theme area is native. Stands of remnant vegetation may or may not already be in existence, though often it has been highly disturbed and

needs revegetating. The species composition and formation of the vegetation in these theme areas are not necessarily representative of the surrounding bushland and may be covered with an array of species ranging from grasses to trees.

Theme Areas

These native vegetation theme areas often provide vital links between stands of remnant vegetation. It also becomes the theme type where remnants occur within the urban landscape.

The theme has also been allocated to open space areas such as drainage reserves where the sole function is drainage. With the planting of native species, these drainage areas can also function as wildlife refuges.

5.4.4 Exotic/Native Mix

Characteristics

The vegetation has a blend of natives and exotics which may already be in existence in home gardens, the streetscape, parks and open space areas. The native vegetation in some instances are remnants of the Box-Gum Woodlands. The exotics include a wide spectrum of ornamental deciduous and evergreen trees, shrubs and groundcover species.

The ratio of exotics to natives is variable, and the streetscapes, home gardens and parks tend to be informal in layout.

Theme Areas

The theme has also been set in areas with large allotments such as in rural subdivisions, commercial and industrial estates and at the interface of the urban and rural landscapes.

The theme has also been designated to areas not fully developed, or to be developed with the aim of preserving the visual quality of the prominent ridges and hills surrounding Bathurst. It is also relevant to create an appropriate edge between the urban and rural environment in areas such as Eglinton, Kelso North, Windradyne, Laffing Waters, Abercrombie and Llanarth.

The theme may also be applied to Yetholme where there is a mix of exotic vegetation within the more settled parts of the village, blending into remnant native vegetation on the outskirts of the locality.

5.4.5 Natives Dominant

Characteristics

This theme is similar to the exotic/native mix, though has a pronounced dominance of native species.

Theme Areas

To the west of the City the theme occurs on the ridgelines around Cherry Tree Hill, White Gate, Wentworth Estate, Boundary Road and the Golf Course. The theme capitalises on the presence of native remnants and the purpose of providing a vital link between the key area of remnant vegetation on Mount Panorama to the Macquarie River along Sawpit Creek and its catchment.

These areas have also been designated in this theme category because of their visual prominence. Native plantings would provide the necessary unity along the ridgeline, providing a solid backdrop to the City's exotic landscape.

Other areas classified in this theme category are Raglan village, rural residential development at White Rock Road, Robin Hill and the industrial estates of Kelso on the O'Connell Road. Native vegetation should be the dominant vegetation type in Raglan, mostly in areas of open space and along roadsides, where solar access is not a requirement.

A predominance of natives in all the theme areas help to create an appropriate transition between the rural and urban environments that are not hard edged.

The use of natives in the streetscape and open space areas also contribute to water minimisation by avoiding trees with high water requirements and setting the theme for the use of natives in home gardens.

5.4.6 Exotics Dominant

Characteristics

This theme is characterised by exotic species as a vegetation type or mixed to a lesser degree with natives.

Theme Areas

These theme areas are located where view appreciation and solar access requires deciduous trees. This particular theme is also more suited to the new residential subdivision areas where the house assumes a large portion of the allotment, gardens are high maintenance and predominately comprise exotic species, remnant vegetation is scarce or absent and the nature strip is incorporated into the front garden.

This theme type also occurs in the older parts of Bathurst, though are not part of the HCA.

Most of the main entrances into Bathurst have been planted with exotic species. The exotic theme will be maintained along the gateways to accent the urban environment.

5.4.7 Waterways

Characteristics

The function of this theme category distinguishes it more so than the characteristics of the vegetation. Many of the regions waterways currently exist in a highly disturbed state in Bathurst City and the older villages, through to less disturbed condition in rural areas. Other creeks exhibit significant erosion.

The waterways where Council has care, control and management over some reaches include the Macquarie River, the Turon River and tributaries, as well as tributary creeks of the Abercrombie River, Campbell River, and the Winburndale River. However, the Council-managed reaches contribute to a very small proportion of these waterways, with most in private or Crown ownership.

These waterways are to be vegetated with native trees and shrubs and free of the most significant environmental weeds such as Willows, Poplars, Blackberries and other garden escapes. In-channel and bank vegetation is to include aquatic and semi-aquatic species that provide favourable habitat features to fauna species. This includes tributary creeks where Council manages large portions of land including Jordan Creek, Hawthornden Creek and Sawpit Creek.

Groundcover vegetation is to be a mix of native and exotic grasses and forbs. Whilst native species are preferred, in reality achieving a high proportion of native species in the groundcover layer may be unrealistic.

For creeks and unnamed flow lines, the existing vegetation may comprise remnant eucalypt woodlands, Willows, priority weeds such as Blackberry and African Boxthorn, or may be completely absent of overstorey vegetation.

The desired vegetation characteristic in these areas would be endemic eucalypts in a woodland formation, scattered understorey species such as wattles and native groundcover species. Casuarina Gallery Forest is the desired vegetation community in some of these waterways including the Macquarie River, Turon River and Winburndale Rivulet.

Theme Areas

This theme type covers the Macquarie River, named and unnamed creeks, major flow lines and drainage reserves in Bathurst.

This theme type also applies to parts of the Turon River at Sofala and Coles Bridge, Peppers Creek Rockley, Grove Creek Trunkey, Mulgunnia Creek, Trunkey Creek, Oaky Creek Wattle Flat, Saint Anthonys Creek Napoleon Reef and Queen Charlottes Creek Perthville.

5.4.8 Floodplains and Wetlands

Characteristics

The Bathurst floodplain prior to European settlement is likely to have been densely vegetated with grasses, forbs and aquatic herbaceous plants with trees and shrubs being mostly absent .

Raglan Creek, the oxbow lakes and meander streams on the floodplain would, in the past, have all functioned as ephemeral wetlands providing habitat for a diversity of plants and animals. Highly disturbed remnants of these wetlands still exist to some degree along Raglan Creek.

Wetland areas will be vegetated with grasses, forbs and semi-aquatic herbaceous plants, and priority weeds such as Willows removed. Where natural values are not predominant, native riparian tree species such as River Sheoak (*Casuarina cunninghamiana*) are planted to provide shade.

Periodic flooding has restricted land use, though the deposition of sediments during flood events and fertile soils have favoured land use activities such as market gardens, agriculture and playing fields.

Theme Areas

This theme type applies to the floodplain areas of the Macquarie River, Raglan Creek and Saltram Creek.

6 SIGNIFICANT NATURAL LANDSCAPES

6.1 VISION

The Bathurst Region is proud of its natural and cultural landscape that provides windows to its culture and heritage, unique rural vistas, unified and rich urban environments, picturesque historic villages and significant areas of natural vegetation that are a jewel to the Region.

6.2 INTRODUCTION

Significant landscapes in this context means those that have considerable importance in the areas of the environment, culture, recreation or education, at the local, state, regional or national level.

The degree of significance may be a matter of personal perception, though some factors are widely recognised such as the need to protect prominent ridges and hillsides for scenic amenity. Other elements such as threatened ecological communities and scenic protection are recognised at a more formalised level, being protected through legislation and local planning provisions.

The significant landscapes of the Bathurst Regional LGA are intrinsically linked with the vegetation themes discussed in the previous section (Refer Section 5) and many strategies and recommendations relating to the landscapes are covered in other sections. However, a number of strategies and recommendations are specific to the landscapes and are addressed accordingly.

MAP REFERENCE

Map B - Significant Vegetation and Natural Landscapes.

6.3 BACKGROUND

6.3.1 Landscape Values

- Significant landscapes contribute to the cultural and rural identity of the Bathurst Regional LGA;
- Natural landscapes provide many environmental and ecological benefits;
- The landscapes are significant for their strong aesthetic appeal for local residents and visitors; and
- Protection of key natural landscapes also protects significant Aboriginal heritage items and culture.

6.3.2 Landscapes of Significance

a) Rural Landscapes and Plateaux

These landscapes primarily include agricultural and horticultural land, hobby farms as well as remnant woodland areas on public and private land. They are depicted as open eucalypt woodlands or plains and are characterised by the 'Australian' landscape.

These landscapes extend throughout the tablelands of the region that frame the area and provide the backdrop to the vistas viewed from within and into Bathurst City and throughout the Region.

The undulating hills and steep wooded ridges in the east and north east from Napoleon Reef and Yetholme, include Wattle Flat as well as Wambool, Eusdale and Winburndale Nature Reserves. Forming part of the dissected Mount Horrible Plateau, it features Snow Gums above 1000m. Below the ridges, scenic rural landscapes occur in the Limekilns area.

Also found at Limekilns within this plateau is the Limekilns Kart area.

The Wiagdon Valley is a visually aesthetic rural landscape in the north, draining to the Macquarie River and surrounded by plateaux.

The Ophir - Hargraves Plateau dominates the northern part of the region from Peel to Sofala and Hill End. The scenic steep ridges overlook the Crudine valley and are dominated by

native woodlands and open forest, with pastures on the lower slopes.

The Rockley Plains are low rolling hills on a plateau dominated by Rockley Mount and features farmland in the valleys. Chifley Dam sits within this landscape on the Campbell River and provides strong aesthetic appeal.

South from Yetholme via Meadow Flat and Tarana, the scenic rural views are seen from Diamond Swamp Road.

Trunkey Creek and its surrounding river flats occur below the wooded Carrawa Range.

The rolling hills and ranges of the Mandurama Slopes landscapes occur in the far south western margin of the region where the Copperhania Nature Reserve provides views of native woodland and forests.

b) Macquarie River Floodplain

The Macquarie River floodplain, with the patchwork of market gardens and remnant wetlands, further enhances Bathurst Region's unique identity, especially on the eastern approach from Kelso and Raglan. The floodplain also allows for an unobstructed line of sight to Mount Panorama from the Great Western Highway.

The Macquarie valley opens to a wide floodplain through the Bathurst granite with gentle slopes.

From many locations within Bathurst the floodplain also provides pleasing views for local residents and visitors.

c) Riverine Landscape and Gorges

The riverine landscape along the Macquarie River is significant on a local, regional and state level, and contributes greatly to the environment, culture, aesthetics, recreation and education within the Bathurst Regional LGA. Albeit degraded with exotic plants, the Macquarie River is a significant natural resource, and rehabilitation will ultimately improve the asset, thereby increasing its relative significance.

In the north of the region, the steep sided, deep gorge tracts with incised meanders dominate the Macquarie and Turon Rivers below extensive tablelands of the Ophir-Hargraves Plateau landscape. Incised across the structural grain of north-south folded geology, open woodland occurs on the semi-stable scree slopes and lower angle slopes, and riparian vegetation of River Sheoak dominate the channel.

The scenic steep ridges overlook Crudine to the north and the Turon River near Bruinbun to the south.

Views of the Turon River are appreciated in the approach to Sofala from the north and south near the village.

Freemantle Road at Gowan is located high on the Ophir Hargraves Plateau and provides views over the Turon River where the road changes direction from east west to north south. The road also has spectacular views over the Macquarie River at Watton.

This theme is continued throughout other significant rivers in the region.

d) Bathurst Plains

The Bathurst Plains are typified by a treeless landscape and provides a contrast to the built-up area of the urban environment. They are viewed from the eastern approach to Bathurst City and are particularly significant as a natural gateway feature. The Bathurst Plains include Eglinton and Laffing Waters which are surrounded by undulating to steep hills. Views of the plains are also seen from Perthville.

Note that the extent of the Bathurst Plains as indicated in Map B is indicative only, and represents a portion of the area visually significant from the eastern gateway approach.

6.4 MANAGEMENT

6.4.1 Guiding Principles

- The Bathurst 2040 Community Strategic Plan includes a strategy to protect and improve the Bathurst Regional LGA's landscapes, views, vistas, and open spaces.
- In the urban areas, many vistas of the slopes and hilltops can be viewed and should remain as natural as possible;
- The edge of urban development should be contained, with the ridges and hills running generally north-south to the west of Bathurst being preserved;
- As well as the ridges and hills to the west of the City, the gentler slopes to the north, east and southwest should be protected as a contribution to the unique rural identity of the City; and
- The scenic value of the wooded slopes and ridges should be protected and promoted to ensure the Region's rural landscapes, views and vistas are preserved and enhanced.

6.4.2 Strategies

TABLE 6.1 SIGNIFICANT NATURAL LANDSCAPE STRATEGIES

STRATEGIES	RECOMMENDATIONS/GUIDELINES
OBJECTIVE 1: To protect the Bathurst Regional LGA's rural identity through landscape protection	
L1 Protect significant landscapes through adequate provisions in appropriate planning instruments.	• Include significant landscapes in the provisions of the LEP.
L2 Plan for urban development to protect the rural landscape and to provide a sense of containment of the built environment.	• Vegetation or natural features to buffer or provide an 'edge' between the urban and rural environment.
L3 Ensure rural landscapes retain the visual characteristics of such a landscape with the advent of any future development.	• Tree scaping with natives, revegetating watercourses and drainage lines, appropriate building materials and/or large allotment sizes need to be considered; and • Landscaping with natives gives a sense of containment to the urban environment and conforms to sound environmental principles.
L4 Promote appreciation of the rural landscapes and vistas through creation of lookouts or pull-over areas to enjoy scenic views.	• Investigate the creation of a pull-over areas or lookouts over Rockley Mount, Wiagdon Valley and Freemantle Road; • Investigate the creation of pull-over areas or lookouts in areas of high scenic value.

7 NATIVE REMNANT VEGETATION

7.1 VISION

The Bathurst Regional LGA has healthy areas of native vegetation that support a diverse range of species, and contribute to the local, regional and state environment in terms of its conservation, recreation and visual significance.

7.2 INTRODUCTION

This section covers the native remnant vegetation occurring as remnants in the rural and urban landscapes.

MAP REFERENCES

Map A – Vegetation Themes

Map B – Significant Vegetation and Natural Landscapes

Map C – Remnant and Riparian Vegetation

Map D - Remnant & Riparian Vegetation Condition Ranking

Map E – Site Specific Projects

7.3 BACKGROUND

7.3.1 Pre-European Vegetation

The Bathurst Regional LGA includes some of Australia's oldest agricultural lands, and as such shows the effects of up to 175 years of grazing and cropping (Goldney and Bowie 1990, cited in Croft *et al.* 1997).

Conclusions drawn from Croft *et al* (1997) indicate that the vegetation in pre-European settlement dramatically changed west of the Blue Mountains. The vegetation of the Blue Mountains with underlying Triassic sandstone geology was covered with a dense layer of shrubs. In contrast the Permian sedimentaries and granite areas over which the early explorers and travellers passed on their way to Bathurst show a far greater proportion of open trees and grass.

Artist's impressions of Bathurst (Croft *et al.* 1997), have revealed relatively open woodlands with a somewhat clumped distribution of trees on the undulating land with a grassy understorey. The vegetation on the hills appears much more dense with paintings of the 'Bathurst Plains' depicting an open grassland.

Despite the openness of the woodlands and the predominance of grasses in the understorey, shrubs were also present on the granites as described by the early botanist Cunningham (Croft *et al.* 1997).

Further conclusions by Croft *et al* (1997) were drawn from early explorers' accounts, indicating that the granite areas (as found around Bathurst) were covered in a relatively open woodland with some treeless areas near the rivers, such as the 'Bathurst Plains'.

Governor Macquarie gives an example of a comment made by an early explorer in his journal of his first visit in 1815 (cited in Semple 1997). He noted that:

> *'the Bathurst Plains extending on both sides of the Macquarie River for 11 miles and for nearly 3 miles on each side of it, being almost entirely clear of timber for that extent…'*

Croft *et al* (1997) noted that while there are some inconsistencies in the estimations of the treeless area by various early observers, there is no doubt that there were substantial areas of grassland around Bathurst which extended well away from the alluvial flats onto the gently undulating granite based soils.

The riparian vegetation around Bathurst, Croft *et al.* (1997) reasoned from early accounts, was almost entirely lined with Casuarinas and they were almost the only trees on the Bathurst Plains. Further evidence suggests that shrubs were more prevalent in the riparian vegetation than away from streams, with the probable exception of the treeless alluvial plains.

Croft (cited in Benson and Redpath, 1998) in his comparative studies of the pre-European and current vegetation in the Bathurst Regional LGA, argued that in the least disturbed areas, the remnant native vegetation today is more or less similar to what it was

prior to European settlement (Croft et al. 1997).

Apart from chemical and physical characteristics of soils and underlying geologies influencing vegetation types, other characteristics have been responsible for shaping the native vegetation of the Bathurst Regional LGA. These are a combination of climatic factors such as the recognised rain shadow, cold winters, hot summers and frost hollows, and the Aboriginal induced fire regimes.

It is important to understand how the landscapes were vegetated prior to European settlement, as it provides the foundation to work towards when considering revegetation, restoration and vegetation management.

7.3.2 What is Remnant Vegetation?

For the purpose of the VMP, remnant vegetation includes naturally occurring local native vegetation that has remained in the landscape following clearing.

Remnant vegetation may be represented by semi-intact woodlands and forests, scattered or isolated trees with a predominately exotic understorey, native grasslands, or sedgelands found in association with wetlands or aquatic environments.

In the Bathurst Regional LGA, the remnant vegetation ranges from semi-intact woodlands and forests, to scattered and isolated trees with a highly altered or degraded understorey. Grasslands and sedgelands also occur as fragmented clumps or growing within a mix of grass and herb species.

Native threatened vegetation communities found within the Bathurst Regional LGA are described in detail in Appendix C and H.

7.3.3 Significance and Values of Native Vegetation

The remnant native vegetation in the Bathurst Regional LGA has considerable value to landholders, downstream properties and the broader Central West community from the range of ecological, social, cultural, educational and recreational benefits it provides.

Even the widely scattered or isolated trees within the urban landscape have value for wildlife, aesthetics and providing a pleasant living environment for residents. Often they provide links or 'stepping-stones' to other remnants which increase their value.

Environmental benefits

- Maintain and protect biodiversity and ecological processes;
- Prevents land degradation such as soil erosion, dryland salinity and rising water tables;
- Contributes to the hydrological cycle;
- Essential function in maintaining ecologically sustainable development;
- Maintains water quality through increased streambank stability, nutrient trapping, and reduced erosion;
- Provides habitat for fauna and flora;
- Protects State and Federally listed threatened species and Endangered Ecological Communities;
- Vegetation reduces accessions to the water table;
- Vegetation acts as a carbon sink absorbing greenhouse gases, impacts on carbon dioxide levels in the atmosphere and enhances the performance of soil as a sink for greenhouse gases;
- Buffers the effects on wind speed, humidity, temperature, water balance and rainfall;
- Buffers climate extremes; and
- Pollution control where vegetation has potential to trap atmospheric pollution, especially in the winter months when fossil fuels and wood are burnt.

Social and cultural benefits

- Mount Panorama, Boundary Road and Mount Stewart are significant rural landscapes as identified in the Bathurst Heritage Study (Hughes *et al* 1990.), because of the skyline views and remnant vegetation. Mount Panorama is considered the most significant;

- Remnant vegetation throughout the rural and village areas of the Bathurst Regional LGA makes a significant contribution to scenic landscapes and village character;
- Value to Aboriginal culture and protects heritage sites, such as scarred or carved trees (NTS Corp, 2012);
- Increased awareness by the community of the value of environmental resources and the expectation that these resources be protected;
- Social responsibility to protect conservation areas for future generations;
- Buffer between adjacent land uses; and
- Council's charter within the Bathurst Regional LGA and the EP&A Act to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible.

7.3.4 Issues and Threats

The health of the remnant vegetation does not occur in isolation of the whole ecosystem and for this reason, many threats and issues relate to elements other than vegetation. Threats and issues relevant to Bathurst Regional LGA are listed below:

- Weed invasion by priority weeds, exotic garden escapes, pasture species and groundcover species commonly found on disturbed sites;
- Fragmentation of remnants;
- Lack of recruitment of native species;
- Impacts from recreation;
- Pressure from pests (e.g. rabbits, exotic birds, cats, foxes);
- Changed ecological function;
- Lack of awareness of value of remnant native vegetation;
- Changed fire regime;
- Grazing from domestic livestock;
- Illegal dumping of garden refuse, household items and littering;
- Firewood collection;
- Urban expansion and development;
- Change in land use;
- Climate change;
- Dieback; and
- Reduction in remnant size.

Future threats that may occur include biosecurity risks such as the pathogens Phytophthora *(Phytophthora cinnamomi)* and Myrtle Rust for example, although they are not currently an issue within the region. The future of weed threats in a changing climate is not well known. Due to changing weather patterns, recreational and land uses, the monitoring of emerging biosecurity risks is warranted.

In addition to future increased temperatures, and drier weather in the western part of the Bathurst Regional LGA, reduced spring rainfall and increased autumn rainfall may result in increased fire behaviour. Extreme weather is likely to result in impacts to large mature and over mature trees.

a) Key Threatening Processes

The BC Act lists Key Threatening Processes that must be assessed for impacts on biodiversity for a development; those relevant to the VMP include:

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands;
- Anthropogenic climate change;
- Clearing of native vegetation;
- Competition and grazing by the feral European Rabbits;
- Competition and habitat degradation by feral goats;
- Herbivory and environmental degradation caused by feral deer;
- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition;
- Invasion and establishment of exotic vines and scramblers;
- Invasion and establishment of Scotch Broom;
- Invasion of native plant communities by African Olive;

- Invasion of native plant communities by exotic perennial grasses;
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants;
- Loss of hollow-bearing trees;
- Loss or degradation (or both) of sites used for hill-topping by butterflies (potentially); and
- Removal of dead wood and dead trees.

7.4 EXISTING SITUATION

Tree cover in the Bathurst City on the 'Bathurst Granite' is generally sparse which contrasts with the surrounding areas which are underlain with metamorphic and sedimentary rocks and have a moderate to dense tree cover (Semple 1997).

Estimates for the Bathurst Regional LGA are that around 62% of native vegetation has been cleared (Kerle & Goldney, 2007, cited by Applied Ecology, 2010). Based on mapping of Broad Habitat Types (BHT), Goldney (2007) found that vegetation on the Bathurst 1:100 000 map sheet was 73% cleared.

Utilising data based on DEC (2006a) modelling, the remaining vegetation (occupying 662km^2) includes Grassy Woodlands of the Slopes and Alluvial Plains (more than 90% cleared), Grassy Woodlands of the Ranges and Tablelands (3%), Dry Sclerophyll Forests (94%), Grassy Woodlands of the Ranges, Tablelands and Slopes (0.3%), Forested Wetlands (2%) and Tall Open Forests (1%) (cited in Mactaggart 2012 and Applied Ecology, 2010).

Based on Mitchell Landscapes (Mitchell, 2002, updated Eco Logical 2008 and BioNet VIS version 3.1 2018), vegetation is over cleared in all the major landscapes within the Bathurst Regional LGA, with the most over cleared being the Upper Macquarie Channels and Floodplains which is 96% cleared. The centrally located Bathurst Granites, the northern Ophir-Hargraves Plateau and the Macquarie and Turon Gorges are all 84% cleared. This is followed by the Mandurama Slopes in the far south west which are 70% cleared, while the Rockley Plains in the south are 62% cleared and Mount Horrible Plateau in the east/ north east is 61% cleared.

Land use changes since European settlement resulted in extensive areas of native vegetation being highly modified in terms of structural and species diversity, species composition and plant abundance. The most obvious impact has been the extensive clearing of the Box-Gum Woodlands which covered the ridges and hillsides around Bathurst, River She-oaks along the riverine system, and native grasses on the 'Bathurst Plains'. It is speculated that large-scale clearing commenced on the undulating country in the early 1930s (Smith n.d., cited in Semple 1997). Clearing has resulted in the native vegetation being retained as small Box Gum Woodland fragments and scattered trees within highly modified grasslands dominated by exotic grasses and forbs.

A number of other major influences have shaped the current vegetation status. These are:

- Decline in Aboriginal land use practices and increase in European land use practices;
- Introduction of domestic livestock in 1815;
- Construction of roads and rail;
- Arrival of rabbits in late 1850's and other exotics such as Blackberry; and
- Introduction of Subterranean Clover and superphosphate for pasture improvement.

7.4.1 Vegetation Condition

The condition of these fragments and scattered trees varies depending on current and past land use practices. Across the Bathurst Regional LGA, there is one remnant managed by Council likely to be in a near natural state, which is located at Eusdale. Remnants that are slightly disturbed are found on Mount Panorama and reserves linking to the Macquarie River that have been restored. There are several examples of reserves with remnant vegetation in slightly disturbed condition that are scattered throughout the region.

The characteristics of each condition rank are outlined below.

Near Natural

Remnant vegetation in excellent condition with complex structure, abundant regeneration, a diversity of species, low to absent weed incidence, healthy vegetation and ample fauna habitat. The remnant size is also large (greater than 100 hectares) and connects with other remnants.

Slightly disturbed

Some disturbance has occurred but the remnant still retains characteristics of high value.

Modified

The structure and species diversity of the vegetation community has been reduced due to past or continuing disturbances and regeneration may be affected. The presence of weeds further reduces the value of the remnant, as do signs of declining health of the vegetation. Size of remnant reduced and fragmented.

Degraded

Long-term sustainability severely affected with nil to poor regeneration of native species. Understorey species may be absent, and groundcover dominated by weeds or introduced species. The health of the remnant may be showing dieback and death. Condition of the remnant and fauna habitat further reduced due to lack of resources, low connectivity and small size of remnant.

Highly Degraded

Areas of low value may have no remnant vegetation, dead or dying trees, highly modified groundcover layer and a dominance of environmental weeds. Remnants are isolated and often exist as widely scattered individuals. Habitat value for most native fauna is very low.

An initial assessment of the condition of native vegetation is a relatively straight forward task.

Healthy stands of native vegetation are generally characterised by:

- The absence of weeds and introduced grasses;
- Groundcover plants dominated by native plants;
- Good biodiversity of grass, shrub and tree species;
- Active regeneration of plants;
- The presence of old trees, preferably with hollows;
- The presence of fallen logs and branches; and
- Healthy foliage cover.

Alternatively, degraded stands of native vegetation are generally characterised by:

- Invasions by weeds, pests and introduced species;
- Groundcover plants dominated by exotic plants;
- Few or no native shrubs and understorey plants;
- No active regeneration;
- Old trees and hollows are missing;
- General absence of fallen logs and branches; and
- Obvious sign of tree-dieback (DLWC Vegetation notes 2002).

The best examples of remnant vegetation within Council lands in the former Bathurst City area occur in the Boundary Road Reserve, Mount Panorama precinct, the slopes of Mount Stewart and the vegetation linkages through the Brooke Moore Reserve bushland and Hector Park following successful restoration works.

Reserves in the best condition in the villages and rural areas are the inaccessible Eusdale Recreation Reserve adjacent to Eusdale Nature Reserve, Tambaroora Racecourse Hill End, Lachlan Road Bushland at Caloola, and bushland at the rear of Trunkey Recreation Reserve. A Council owned parcel opposite the Peel Flora and Fauna Crown Reserve is also in good condition as it has a diverse vegetation structure and species apart from erosion gullies associated with the drainage lines.

The remnant vegetation within the Bathurst Regional LGA is mostly classed as modified, with some reserves being disturbed and slightly disturbed, and fewer in a highly degraded condition. The long-term sustainability of these remnants is moderate as structure and species diversity has been

reduced due to disturbances and weeds, regeneration may be affected, and they are reduced in size and/or fragmented.

With intervention through appropriate management, the majority of the remnants in moderate condition can be restored. However, if Council intervention does not occur these remnants will also be under threat of further degradation if pressures are not controlled through active vegetation management.

The structural formations of the timbered remnants in the Bathurst Regional LGA are woodlands and forests, and scattered trees in a predominately grassy understorey. Understorey shrubs occur throughout the region in isolated remnants and are generally uncommon due to the inherent nature of the woodlands and are further degraded due to grazing pressure.

7.4.2 Threatened Ecological Communities

There are potentially five Threatened Ecological Communities (TECs) in the Bathurst Regional LGA:

- **White Box Yellow Box Blakely's Red Gum Woodland** (Box Gum Woodland) is listed as an Endangered Ecological Community (EEC) in the BC Act and as Critically Endangered (CEEC) under the EPBC Act. This ecological community can occur as either woodland or derived grassland where the trees have been removed (OEH 2017b). These woodlands would have covered a large proportion of the Bathurst Regional LGA, particularly to the south-east. There are significant areas of the Box-Gum Woodland EEC remaining throughout the rural areas of the Bathurst Regional LGA including remnant patches in the urban/peri-urban areas around Mount Panorama, along watercourses and threaded through to the Macquarie River;
- **Tableland Basalt Forest in the Sydney Basin and South Eastern Highlands Bioregions** is listed as an EEC under the BC Act. Aligning with BVTs 1, 4 and 11, the presence of the Tableland Basalt Forest EEC has been mapped in the Winburndale Nature Reserve, Eusdale Nature Reserve, Eusdale Recreation Reserve, and on Mount Panorama;
- **Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions** is listed as an EEC under the BC Act 2016. This EEC mainly occurs on valley floors, margins of frost hollows, footslopes and undulating hills between approximately 600 and 1400 m in altitude, and lie to the east of Bathurst in the locality of Sunny Corner;
- **Montane peatlands and swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highland and Australian Alps bioregions** is listed as an EEC under the BC Act and the EPBC Act . These are generally absent or poorly represented in the rugged hilly environments prevalent in the northern part of the Bathurst Regional LGA; and
- **Natural Temperate Grassland of the South Eastern Highlands Bioregion** is listed as CEEC under the EPBC Act. Broad treeless benches, plains and slopes of the Macquarie River floodplain are referred to by Marshall (2016) with reference to Governor Macquarie's camp and early settlement; and are depicted in Lewin's 1815 painting of grass sloped remnants of ancient flood terraces. The naming of the 'Bathurst Plains' following the discovery of Bathurst in 1813, also suggested the presence of this vegetation community. However, native grasslands are largely unmapped (Applied Ecology, 2010) and thought to occur in the Lagoon and Raglan areas (INFFER, Council draft DCP maps 2018).

Further information on TECs is provided in Appendix C.

7.4.3 Threatened and Significant Flora and Fauna Species

Mjadwesch (2010, 2011) and Applied Ecology (2010) documented that the Bathurst Regional LGA has 11 threatened species of plants, of which seven are classified as Vulnerable, and four Endangered.

Zieria obcordata has been recorded at several locations around the Rocks and north to Crackerjack Rock, while Aromatic Peppercress has been recorded at two locations near

Perthville. *Eucalyptus pulverulenta* has been recorded between Perthville and Cow Flat, Capertee Stringybark from several locations in Winburndale Nature Reserve, and there is an outlying record of Robertson's Peppermint near Sunny Corner.

Seventy-two species of animals were listed as threatened under State and Federal legislation including the BC Act, the *Fisheries Management Act* (FM Act), and EPBC Act. Of these, 55 species are classified as Vulnerable, 15 Endangered, one Critically Endangered, and one presumed extinct. A number of these have a limited distribution in the Bathurst Regional LGA, including the Purple Copper Butterfly, Green and Golden Bell Frog, Pink-tailed Legless Lizard, Glossy Black Cockatoo, Barking Owl, Masked Owl, Spotted-tailed Quoll, Large Eared Pied Bat, and the Eastern Bentwing Bat.

It should be noted that plants, animals, ecological communities or threatening processes listed in the BC Act can change over time depending on factors such as recovery rates, threats, increased awareness and ecological understanding. Therefore, the status of these as outlined are a snapshot in time for some of the species and is intended as a guide only.

Appendix H documents threatened species recorded on Council land in the Bathurst City, villages and rural areas. It also lists key biodiversity assets for the Region identified in the INFFER database, part of a Commonwealth Environment Research project for an Investment Framework for Environmental Resources. Section 7.4.4 outlines some of the recovery actions in Commonwealth and State programs.

The following species have been recognised as significant in the Bathurst Regional Biodiversity Management Plan and/ or the Biodiversity Issues paper and occur on Council land or in rural villages.

a) Bathurst Copper Butterfly

The Bathurst Copper Butterfly (*Paralucia spinifera*) is an iconic threatened species that forms the Council logo. It is endemic to the Bathurst – Lithgow areas, rare, and the only listed invertebrate in the Bathurst Regional LGA. Listed as Endangered under the BC Act and Vulnerable under the EPBC Act, it is only found in elevations above 900 metres where it feeds on a form of Blackthorn, *Bursaria spinosa* subsp. *lasiophylla*. It also depends on a small black ant, *Anonychomyrma itinerans*, to protect the caterpillar from predation and host the pupae within their nest.

Threats include clearing of its habitat, modification through clearing, spraying, grazing, fire, weed invasion and illegal collection. It has been recorded in the vicinities of Yetholme, Sunny Corner, Winburndale Nature Reserve, Mount David, Mount Everden, Eusdale Nature Reserve and Turon State Forest (Mjadwesch 2011).

b) Threatened Woodland Birds

There are a number of woodland birds that are declining in open woodland habitats throughout southern Australia, including the Speckled Warbler (*Chthonicola sagittata)*, Scarlet Robin (*Petroica boodang*) Diamond Firetail (*Stagonopleura guttata)* and the Brown Treecreeper (*Phyrrholaemus sagittatus).* The Regent Honeyeater (*Anthochaera phygia*), which is listed as Endangered under the BC Act and the EPBC Act, has been recorded from Boundary Road Reserve, the Bathurst Waste Management Centre and Napoleon Reef.

Generally, threats to these birds that are relevant to the Bathurst Regional LGA include:

- Clearance of remnant grassy woodland habitat for paddock management reasons and for firewood;
- Poor regeneration of grassy woodland habitats;
- Modification and destruction of ground habitat through removal of litter and fallen timber, introduction of exotic pasture grasses, heavy grazing and compaction by stock and frequent fire;
- Habitat is lost and further fragmented as land is being cleared for residential and agricultural developments. In particular, nest predation increases significantly, to nest failure rates of over 80%, in isolated fragments;
- Nest failure due to predation by native and non-native birds, cats, dogs and

foxes particularly in fragmented and degraded habitats;

- Infestation of habitat by invasive weeds;
- Aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners; and
- Climate change impacts including reduction in resources due to drought.

Due to the fragmented nature of the populations and their small size the species is susceptible to catastrophic events and localised extinction (OEH profile, 2018).

c) Koala

The Koala (*Phascolarctos cinereus*) is listed as Vulnerable in the EPBC Act and the BC Act.

Koala populations are known from Rockley Mount, Cow Flat and Caloola and sightings occur across the region including in a number of Council reserves and villages including Hill End, Perthville, and Turondale.

Threats include loss, modification and fragmentation of habitat; vehicle strike, predation by roaming or domestic dogs; intense prescribed burns or wildfires that scorch or burn the tree canopy; Koala disease; heat stress through drought and heatwaves; human-induced climate change; poor understanding of population distribution and trend and poor understanding of animal movements and use of habitat.

7.4.4 Threatened Species Plans

a) Recovery Plans

A number of current Recovery Plans have been prepared by the Commonwealth and NSW Governments for the species identified in the Bathurst Biodiversity Management Plan and Biodiversity Issues Paper:

- Bathurst Copper Butterfly (NSW);
- Bilby (Commonwealth);
- Brush-tailed Rock Wallaby (NSW and Commonwealth);
- Grassland Earless Dragon, (Commonwealth);
- Large-eared Pied Bat (Commonwealth);
- Koala (NSW);
- Masked Owl (NSW);
- Powerful Owl (NSW);
- Regent Honeyeater (Commonwealth);
- Southern Brown Bandicoot (NSW);
- Spotted-tailed Quoll (Commonwealth);
- Swift Parrot (Commonwealth);
- Superb Parrot (Commonwealth);
- Plains Wanderer (Commonwealth);
- White Box-Yellow Box – Blakelys Red Gum Grassy Woodland (Commonwealth); and
- *Zieria obcordata* (Commonwealth).

b) Saving Our Species

Saving Our Species (SOS) program has developed actions to ensure the conservation of species to secure it from extinction in 100 years.

Each threatened species is allocated to a management stream:

- Site managed species;
- Landscape managed species;
- Iconic species;
- Data-deficient species;
- Partnership species; and
- Keep watch species.

A number of landscape managed species occur on Council land. Section 8.4.12 outlines the recovery actions for these species under the SOS program.

c) Threatened Species on Council Land

Appendix H provides details on the threatened species records found on Council land.

In the reserve linkages from Mount Panorama to the Macquarie River, the conservation and restoration of woodland and riparian habitats of Box-Gum Woodland and Casuarina Gallery Forest is important for the conservation and recovery of the following species:

- Booroolong Frog;
- Diamond Firetail;

- Gang-gang Cockatoo;
- Little Eagle;
- Painted Honeyeater;
- Regent Honeyeater;
- Scarlet Robin;
- Speckled Warbler; and
- Varied Sittella.

In the rural areas, the recovery of a number of species is linked to the conservation and restoration of habitat in these reserves. The conservation and restoration of woodland and riparian habitats of Box-Gum Woodland and Tablelands Basalt Forest is important for the conservation and recovery of the following species:

- Barking Owl;
- Bathurst Copper Butterfly;
- Brown Treecreeper;
- Diamond Firetail;
- Eastern Bentwing-bat;
- Eastern False Pipistrelle;
- Eastern Pygmy Possum;
- Flame Robin;
- Gang-gang Cockatoo;
- Hooded Robin;
- Large-eared Pied bat;
- Little Eagle;
- Little Lorikeet;
- Koala;
- Powerful Owl;
- Regent Honeyeater;
- Rosenbergs Goanna;
- Scarlet Robin;
- Square-tailed Kite;
- Speckled Warbler;
- Spotted Harrier; and
- Varied Sittella.

Common threats and management themes to address include:

- Previous disturbance from mining, clearing of native vegetation, logging, weed invasion, grazing, and firewood collection;
- Disturbance associated with access tracks, recreational use, firewood collection and campfires, and dumping of garden waste;
- Active erosion of creeks and drainage lines;
- Stormwater pollution;
- Lack of recruitment of native vegetation;
- Herbivory by rabbits, deer and livestock;
- Weed invasion by Serrated Tussock and woody weeds in woodlands (Boxthorn, Hawthorn, Firethorn, Sweet Briar and Blackberry) and in riparian areas (Willows, Blackberry, Poplars and Privet);
- Loss of tree hollows;
- Climate change resulting in altered weather patterns, increased temperatures and extreme weather events;
- Altered fire regime; and
- Predation by foxes and dogs.

d) SOS Recovery Actions

SOS recovery actions relevant to the VMP include actions for species that are dependent on vegetation across the landscape:

Habitat Retention

- Retention of a floristically and structurally diverse and spatially variable understorey in patches of woodland (Speckled Warbler, Hooded Robin, Brown Treecreeper);
- Protect and maintain areas of high quality habitat, which includes open forest, woodland, mallee and grasslands with a diverse ground layer, dominated by a mixture of grass species which seed at different times of year (providing a year round food supply) and provides scattered shrubs for shelter. Areas with access to water, especially riparian areas, are particularly important (Diamond Firetail);
- Retention of woody ground debris. Promote the retention of large old trees that have the potential to contribute woody ground debris via the shedding of limbs (Speckled Warbler, Hooded Robin, Brown Treecreeper);

- Retain mistletoe and scattered patches of dense shrubs for nesting habitat, particularly in areas close to water (Diamond Firetail);
- Protect known and potential remnant Gang-gang Cockatoo habitat, particularly tall wet forest and dry sclerophyll forest vegetation communities with large trees supporting hollows that are 10cm in diameter or larger, and manage these areas to allow ongoing regeneration of local native trees, shrubs and ground layer plants. Where possible, negotiate management agreements with landholders that are funded in perpetuity that allows ongoing recruitment of native local trees, shrubs and grasses (Gang-gang Cockatoo);
- Conserve old-growth forest stands and other areas of known habitat (Spotted-tailed Quoll);
- Protect and maintain high quality habitat, which consists of open forest and woodland with a mosaic of open and timbered areas, including wooded farmland, gallery forests and wooded floodplains along water courses and around wetlands. Riparian areas are particularly important (Little Eagle);
- Protect and maintain areas of high quality habitat, particularly areas of extensive tall forest (dominated by trees more than 20m in height), which include areas of high productivity foraging habitat around creeks, rivers and wetlands (Eastern False Pipistrelle); and
- Protect and maintain high quality foraging habitat in the vicinity of maternity caves. Target high productivity habitats, primarily riparian areas, wetlands, and other areas of native vegetation associated with high moisture status and fertility (Eastern bent-wing Bat).

Herbivory Control

- Exclude grazing from suitable habitat, or reduce grazing intensity and regularity so that a diverse grass sward and scattered shrub layer is maintained, and seeding grasses are present throughout the year (Diamond Firetail); and
- Apply occasional strategic grazing to sites with high productivity (natural and secondary grassland and woodland on low-lying productive sites; not low productivity sites such as hillslopes) to ensure ground layer biomass does not build up. Grazing should only occur in remnants in mid- to late summer and ensure that stock numbers and timeframes are sufficient to reduce standing live and dead matter but not to a point at which bare ground is exposed (advice from an agronomist may be sought) (Scarlet Robin, Flame Robin).

Weed Control and Restoration

- Increase and enhance native ground cover by replacing areas of exotic perennial pasture grasses (e.g. *Phalaris*, Cocksfoot, *Paspalum*) or aggressive environmental weeds (e.g. African Love-grass, Serrated Tussock, St John's Wort, Coolatai Grass) with native grass species appropriate to the vegetation type. Weeds should be removed using best-practice methods as prescribed by the herbicide manufacturer. Techniques for removal and replacement of ground layer species are in development and could be applied with the appropriate expert assistance (Scarlet Robin);
- Target removal of weeds that are significantly compromising habitat values (e.g. invasive perennial grasses) and restore native vegetation. Care should be taken to avoid widespread removal of beneficial exotic woody vegetation without replacement and avoid non-target impacts of herbicides (Speckled Warbler, Varied Sitella, Hooded Robin, Brown Treecreeper);
- Undertake control of invasive exotic plant species that compete with native grasses, so as to increase the prevalence and diversity of food plants, in suitable habitat. (Diamond Firetail);
- Remove introduced fruit or berry producing plants (for example Blackberry, Hawthorn, Cotoneaster and Privet) that provide a food supply for nest predators such as Pied Currawongs (Diamond Firetail);
- Implement control of exotic berry-bearing trees or shrubs (e.g. Sweet Briar Rose, Hawthorn, Blackberry) in woodland remnants and ensure to replace removed thickets with locally indigenous species, particularly bipinnate wattles (*Acacia* spp.), prickly native shrubs (e.g. *Bursaria spinosa*) or she-oaks (*Allocasuarina* spp.), as appropriate (Scarlet Robin, Flame Robin);

- Improve prey availability through restoration of degraded remnants, particularly riparian areas. Increase structural complexity and species diversity in the understorey through the control of invasive exotic plants, the removal of thick swards of exotic pasture grasses, management of grazing pressure and potentially augmentation planting with locally appropriate native species (Little Eagle);
- Identify and target restoration and revegetation projects at areas where connectivity between large areas of known habitat is compromised, with the aim of increasing the width, condition and security of critical landscape links (Spotted-tailed Quoll); and
- Source fallen trees and logs from development sites and place them into rehabilitated remnants (Scarlet Robin, Flame Robin).

Revegetation of Linkages

- Undertake revegetation, using a diverse mix of locally appropriate native species, focussing on expanding and connecting areas of existing habitat. Where appropriate, establish new habitat patches in areas where native vegetation cover is lacking. Target the productive lower parts of the landscape, especially areas adjacent to streams, which may provide important drought refuges. To maximise these benefits, riparian plantings should be at least 50m wide (Speckled Warbler, Hooded Robin, Brown Treecreeper);
- Undertake revegetation, using a diverse mix of locally appropriate native species, which will produce high quality habitat. Revegetation should focus on expanding areas of existing habitat, connecting isolated habitat patches (either through corridor or stepping stone plantings) or establishing additional habitat patches in landscapes with already existing, although insufficient, patches of suitable habitat. Areas with access to water, especially riparian areas, are particularly important, although care should be taken to ensure that riparian revegetation programs are sufficiently wide (minimum 50m wide), and that the composition of the ground and understorey is managed. (Diamond Firetail, Varied Sitella, Hooded Robin). Revegetation should focus on expanding areas of existing small (less than 10ha) habitat patches, particularly riparian habitat, and creating wooded habitat patches around tall isolated trees (Little Eagle);
- Undertake revegetation, using a diverse mix of locally appropriate native species. Revegetation should focus on areas of good moisture and fertility, particularly riparian areas and wetlands. Priority should be given to expanding existing small habitat patches (Eastern Bent-wing Bat);
- Apply "corridor" or "stepping-stone enclosure" (20x20m plots maximum 100m apart) plantings to reconnect patches of isolated habitat, ensuring corridors are sufficiently wide and varied in structure and composition to deter noisy miners (using a mix of canopy and mid-layer tree species, shrubs, tussocky ground layer species). This measure is particularly appropriate along riparian corridors or along existing fence lines. Plantings must use locally endemic species, appropriate to the vegetation type predicted for replanting sites (Scarlet Robin, Flame Robin);
- Apply augmentation planting of missing structural layers (e.g. mid-layer wattles (*Acacia* spp.), shrub layer species, or coarse tussocky ground layer species), using locally indigenous species appropriate to the vegetation type predicted for replanting sites (Scarlet Robin, Flame Robin);
- Create buffers around existing remnants and increase size of remnants by fencing out a large area surrounding existing remnants. Such buffers could consist of a native grassy ground layer, with or without scattered or regenerating trees. Buffers could be additionally planted with locally indigenous trees and shrubs; buffers provide additional feeding grounds for the Flame Robin, as well as providing for future colonisation of native woody species (trees and shrubs) (Scarlet Robin, Flame Robin);
- Ensure populations remain connected by avoiding gaps greater than 100m between habitat patches and along linear remnants. Eliminate gaps through revegetation (either corridors or stepping stone plantings), focusing on important movement pathways (Hooded Robin, Brown Treecreeper);

- Restore Gang-gang Cockatoo habitat in strategic locations close to known habitat and movement corridors, using appropriate local tree, shrub and ground cover species. Care must be taken to ensure that the removal of exotic berry-bearing shrubs and trees such as Cotoneaster, Hawthorn and Pyracantha, that provide foraging habitat, is compensated for by planting of appropriate native foraging plant species such as acacias and eucalypts (Gang-gang Cockatoo); and
- In areas with resident Koalas, and in recognised corridors between Koala habitats, undertake projects to improve the quality of existing habitat or create new areas of Koala habitat. Projects should include resources for long-term monitoring and on-going management (Koala).

Large Old Paddock Trees

- Retain large old trees (particularly isolated paddock trees and hollow-bearing trees, live and dead). Undertaking restoration and revegetation to replace cohorts of trees where they have been removed from the landscape, particularly in areas adjacent to and connecting woodland remnants (Varied Sitella, Brown Treecreeper); and
- Increase the abundance of paddock trees, particularly large ones, by protecting existing trees, and supplementary planting or protection of natural regrowth (Little Eagle).

Tree Hollows

- Identify sites where hollows are limiting and develop and implement strategies to increase hollow availability that have clear objectives and include monitoring, maintenance, and reporting requirements. Actions include nest box installation, the humane control of introduced species, and the protection of trees having the potential to develop hollows (Brown Treecreeper).

Conservation Agreements

- Where possible negotiate in-perpetuity covenants or stewardship agreements to landholders with high quality remnant woodland habitat, agreements should preferably be funded in perpetuity (Speckled Warbler, Diamond Firetail, Varied Sitella, Scarlet Robin, Flame Robin, Little Eagle, Brown Treecreeper, Eastern Bent-wing Bat, Eastern False Pipistrelle); and
- In areas with resident koalas, promote habitat security through permanent protection such as voluntary private land conservation agreements (Koala).

Use of Fire

- Control biomass accumulation in productive sites by applying strategic patch burns; burning up to 5% of a site in any year. The majority of a site can be burnt on a long rotation, but unburnt refuge patches (up to 10% of a site) should be retained. (Scarlet Robin, Flame Robin);
- Increase and enhance native ground cover by applying mosaic-style patch burns, particularly in remnants with high cover of exotic annual pasture grasses (e.g. oats, ryegrass, *Bromus*, barley). Most of the site can be burnt on a long rotation, burning up to 5% of any site per year, but unburnt refuge patches of 10% of the site should be retained (Scarlet Robin, Flame Robin);
- Liaise with land managers and landholders managing fire to raise awareness about the importance of live and standing dead hollow-bearing trees, and to minimise losses of these trees when carrying out prescribed burns (Gang-gang Cockatoo); and
- In association with relevant fire authorities and land managers ensure that koala populations and habitat areas are identified as assets for protection in fire planning tools. Develop Koala Fire Management Risk Plans with NSW Rural Fire Service and other land managers to identify fire management protocols that minimise impacts on koalas and their habitat (Koala).

Community Awareness

- Raise awareness among landholders in a local area known to have important habitat, to engage them in proactive management and monitoring of the species' population on their land (Speckled Warbler, Hooded Robin, Brown Treecreeper);
- Liaise with landholders to raise awareness of the importance of retaining standing dead trees, fallen trees, coarse woody debris and logs in remnants, and

place material from fallen trees and logs into rehabilitated remnants if sourced from non-remnant vegetation (e.g. developments) (Scarlet Robin, Flame Robin);

- Raise public awareness of the impact of firewood collection, cleaning up, and fuel reduction burns on this critical resource (Speckled Warbler, Brown Treecreeper);
- Raise public awareness of the damage caused to wildlife habitat by slashing/underscrubbing, over-grazing, and frequent fuel reduction burns (Brown Treecreeper);
- Raise public awareness about the potential for domestic cats and dogs to prey on or disturb Speckled Warblers, especially during the nesting period. Exclude dogs from important areas of urban habitat via regulation and/or fencing, and confine cats and dogs to residential premises (Speckled Warbler);
- Raise public awareness of the importance of large old trees (particularly isolated paddock trees and hollow-bearing trees, live and dead) (Varied Sitella, Brown Treecreeper);
- Encourage landholders to protect ground layer and midstorey vegetation by implementing sensitive grazing practices and avoiding slashing or underscrubbing, and to promote the retention of a floristically and structurally diverse and spatially variable understorey in patches of woodland (Varied Sitella);
- Initiate a community education program with a focus on threatened woodland birds in important parts of the Flame Robin's range. Actions may include promotion on the OEH website; developing landholder guidelines; running bird identification courses and threatened woodland bird field days. In particular these events should demonstrate Flame Robin habitat attributes at prime sites and encourage experts to attend Landcare or other non-government organisation events, schools, agricultural shows etc. (Scarlet Robin, Flame Robin); and
- Raise awareness amongst land managers in areas where Little Eagles are known to occur of the risks of secondary poisoning as a result of the use of Pindone or second generation rodenticides. Encourage the use of alternative poisons (such as 1080 or Coumatetralyl) and control techniques such as warren ripping (Little Eagle).

Competitor and Predator Control

- Measure the abundance and impact of Noisy Miners on species populations and habitat, and implement appropriate management actions with demonstrated effectiveness (e.g. direct control, habitat restoration, habitat modification by reducing the amount of edge and establish a structurally complex understorey), to reduce the impacts of noisy miners, if/where required (Varied Sitella, Hooded Robin, and Brown Treecreeper); and
- Implement (or augment coordinated), cross-tenure, landscape scale predator control programs in areas where significant populations of Spotted-tailed Quoll are known to occur, and monitor populations of the target introduced predator (Spotted-tailed Quoll).

Increased Temperatures

- Trial usage and on-going feasibility of artificial water sources in areas prone to heatwaves and drought (Koala); and
- Identify priority areas to restore and manage refuge habitat and increase habitat connectivity in areas prone to heatwaves and drought (Koala).

7.5 KEY AREAS OF REMNANT VEGETATION

There are a number of key remnant vegetation areas across the Bathurst Regional LGA that are of high cultural value, high conservation significance, however are increasingly under pressure from a number of sources.

The values, specific threats and issues, and differing management regimes of this remnant vegetation warrant a closer focus, and as such, some of these parks and reserves have detailed plans of management prepared.

Other reserves that were documented when preparing the VMP update are also addressed below.

Bathurst City

These include:

- Mount Panorama including Albens Reserve, Mount Panorama Track Reserve, Hinxman Vista, Sulman Park, Reid Park and McPhillamy Park;
- Blayney Road Common;
- Boundary Road Reserve;
- Brooke Moore Oval and part of Hector Park; and
- Bathurst Bike Park

Villages and Rural Areas

These include:

- Chifley Dam (managed under Chifley Dam Water Management Plan – not addressed in this VMP);
- Eusdale Recreation Reserve (potential transfer to adjoining Nature Reserve);
- Lachlan Road Bushland Caloola;
- Hill End English Lane;
- Hill End Tambaroora Racecourse;
- Mulgunnia Recreation Reserve;
- Peel Quarry and surrounding bushland;
- Sofala Road Reserve adjacent to Peel Flora and Fauna Reserve;
- Trunkey Creek Recreation Reserve;
- Trunkey Creek Crown Reserve;
- Trunkey Creek Resting Reserve;
- Hillview Reserve Napoleon Reef;
- Wattle Flat Racecourse and Golf Course; and
- Wattle Flat Limekilns Rd Crown Land.

a) Parks and Reserves with Remnant Vegetation Mount Panorama

Albens Reserve

Mountain Straight, Mount Panorama; Lot 89 DP 750357, Lot 11 DP 11215971.

The 24 ha reserve on the north western side of Mount Panorama is part of a complex of remnant vegetation in Bathurst City's outskirts. It protects examples of Box-Gum Woodland and features White Box (*Eucalyptus albens*) dominating the canopy. It forms part of a conservation link of high value remnant vegetation from Boundary Road, along the western and southern face of Mount Panorama to Vale Road.

The reserve provides habitat for threatened fauna under the BC Act including Diamond Firetail, Painted Honeyeater, Gang-gang Cockatoo and Little Eagle which have been recorded in the reserve. It may also provide potential habitat for species recorded in the nearby Boundary Road Reserve including the Speckled Warbler, Regent Honeyeater, Scarlet Robin and the Varied Sittella.

A range of environmental works have been undertaken by Council as part of the 'Racing to Save Mount Panorama Woodlands' project including revegetation, and control of weeds, rabbits and erosion.

The on-ground works will require ongoing treatment, maintenance and monitoring.

Hinxmans Vista and Mt Panorama Track Reserve (Inside the Track)

Brocks Skyline, Mount Panorama; Lot 251 on DP1148187, Lot 128 on DP1139748, and Lot 2 on DP773864.

The area contains Box-Gum Woodlands with understorey shrubs and native grasses and forbs. Shrubs present include Lightwood (*Acacia implexa*), Silver Wattle (*Acacia dealbata*), and scattered Blackthorn (*Bursaria spinosa subsp. lasiophylla*). The rocky, hilly terrain is favoured habitat for a number of native fauna species, including a small group of Wallaroos (*Macropus robustus*).

The Soil Conservation Service (1978) has identified the slope gradients of this area to exceed 30 per cent, and as such, it inherently has an extreme erosion hazard. Land use has been constrained due to the erosion hazard and remains undeveloped. Any increase in loading by building construction or in slope angle by cut operations in this area has the potential to create instability problems and possible soil movement. Without careful consideration to vegetation issues within this area serious erosion is likely to occur and silt will be deposited in local drainage systems. Removal of trees and shrubs are likely to increase the hazard of erosion and soil movement (Soil Conservation Service 1978).

Threats to the protection and enhancement of vegetation in these reserves include

unrestricted vehicle access, littering, exotic weeds and rabbits. Typical urban weeds such as Hawthorn, Sweet Briar, Cotoneaster, Privet and Blackberry are scattered throughout the area, particularly along drainage lines.

Reid, Sulman and McPhillamy Parks (Top of the Mount)

Brocks Skyline, Mount Panorama; Lot 40 DP1056379, Lot 1 DP634401, Lot 40 DP1056379

Parks and reserves towards the top of Mount Panorama contain Box-Gum Woodland, with possible Tablelands Basalt Forest within Sulman Park. The campground areas are maintained through slashing and therefore have no shrub layer or recruiting Eucalyptus trees. The groundcover contains a range of native and exotic grasses and herbaceous species. The remainder of Sulman Park is not mown and contains a high proportion of native grasses and forbs. The vegetation towards the top of Mount Panorama is located in a key recharge area and the remnants contribute significantly to landscape protection and scenic amenity.

High recreational usage occurs during key race events including camping and observation areas for the race circuit. A motocross track exists on the south-western slope of the Mount. Threats to this vegetation are therefore associated with these land uses including erosion, degradation of groundcover plants, loss of habitat features on the ground (large woody debris, leaf litter, grassy tussocks), collection of firewood, vandalism, declining condition of the trees, failure of trees to recruit and soil structural decline. Exotic weed invasion, particularly Hawthorn and Blackberry, is occurring outside of the campsite areas within Sulman Park.

b) Mitchell

Blayney Road Common

Stewart Street, Mitchell; Lot 7029 DP 94620, Lot 7313 DP 1142916; Crown Reserve R28704 for Public Recreation, Council Reserve Trustee.

Blayney Road Common contains Box-Gum Woodland and provides a link to Boundary Road Reserve. It forms part of the major entrance corridor into Bathurst and is one of only a few natural landscape public open spaces remaining in the Bathurst City area. The reserve has woody weeds in the riparian zone which are gradually being controlled and replaced with native vegetation. Unauthorised vehicular traffic to the site has been controlled since 2009 which has reduced historical issues with rubbish dumping, vehicle tracks and vegetation damage.

The site is being restored to enhance the quality of the remnant Box-Gum Woodland and to improve the vegetated link to Boundary Road Reserve.

Boundary Road Reserve

Boundary Road, Mitchell; Lots 283 and 284 DP 47960; Crown Reserve R93260 for Public Recreation, Council Reserve Trustee. (Note that the land parcel details are taken from Council's Land Register and differ from those identified in the Landcare Group's Plan of Management).

The reserve protects Box-Gum Woodland and has been documented as being very good to good conservation value in the Bathurst Biodiversity Management Plan 2012. The reserve does not allow livestock grazing or collection of firewood. Current land usage includes passive bushwalking, bird watching, cycling and picnics etc. Recreational usage has increased since the construction of walking trails.

Management is undertaken by the Boundary Road Reserve Landcare Group with financial support from Council to implement the works in the plan of management. Management issues documented include weeds, pest animals, fencing to restrict domestic animals and gully erosion in Hawthornden Creek. The group manages the walking track, trail markers, signs and seats, collects rubbish, removes weeds, undertakes replanting with locally endemic trees, shrubs, grasses and forbs; and installs and monitors nest boxes.

c) Orton Park

Bathurst Bike Park

357, 378 College Rd Orton Park; Lot 20 DP 1119593, Lots 1-3 DP 778506, Operational land.

The Box-Gum Woodland is dominated by Yellow Box (*E. melliodora*) and there have been sightings of quolls in the area (2008). The semi-cleared woodland is in moderate condition and contains leachate ponds for treatment of runoff from the adjoining waste management centre, a mountain bike track and the Bathurst Cycle Park Velodrome. There is a contour bunding system in place to address soil erosion, and weed invasion including Catheads, Sweet Briar, Boxthorn and Blackberry.

Management of the land should retain Box-Gum Woodland and undertake bush regeneration, allow sensitive construction and use of the mountain bike track, and consider future redesign of leachate ponds as chain of ponds wetland system.

d) West Bathurst

Brooke Moore Reserve and part of Hector Park

Vittoria Street West Bathurst; Lot 7013, 7014 & 7015 DP 1114435, Crown Reserve R79362 for Public Recreation, Council Trustee.

Brooke Moore Reserve and the land north of the Indoor Sports Stadium consist of remnant vegetation of Box-Gum Woodland EEC. Brooke Moore Reserve contains a groundcover dominated by native tussock grasses, primarily Kangaroo Grass (*Themeda triandra*), and a moderate diversity of native forbs and rushes. Hoary Sunray (*Leucochrysum albicans var albicans*) has been recorded immediately south of the Rural Fire Station in the northeast corner of the reserve.

A small ecological burn occurred in 2018 with the aim of increasing diversity of native groundcover flora.

The condition of the bushland could be enhanced through bush regeneration, with removal of privet and other woody weeds through cut and paint technique. Practices to improve vegetation condition should continue including restricting the slashing of the native grasses in remnant vegetation areas following flowering and seed set, restricting vehicle access, weed control, addressing illegal dumping of rubbish and garden refuse, and additional mosaic style ecological burns.

e) Hill End

Hill End Tambaroora Racecourse

Andersons Road, Hill End. Lot 7300 DP 1143098. Crown Reserve 590072 for Public Recreation – Racecourse, Council Reserve Trustee.

The town of Tambaroora was established before Hill End, and following the 1851 gold rush the racecourse was established around 1852 or 1853, holding annual races with the land being dedicated in 1875. Today the course fence, stock yards, a small dam, and access track are still present.

The vegetation is regrowth in good condition being surrounded by a large area of native vegetation. It is mapped as Stringybark - Box - Gum Woodland, with Blakelys Red Gum (*E. blakelyi)*, Brittle Gum (*E. mannifera*) and Inland Scribbly Gum (*E. rossii*) open woodland with understorey of Sifton Bush (*Cassinia arcuata*), *Acacia decora, Dianella prunina, Lomandra longifolia, and Lomandra filiformis*. Due to the age of the regrowth vegetation there are no hollow bearing trees. It has been assessed as having good or very good ecosystem condition ratings and conservation values.

To determine future management, the site requires a heritage assessment including historic analysis, heritage inventory and heritage works schedule within the context of high conservation value vegetation.

Hill End English Lane

English Lane Hill End; Lot 368, DP 756905; Crown Reserve for Public Recreation, Council Trustee.

The small park is mapped as Red Stringybark – Blakelys Red – Gum – Yellow Box Woodland that equates to Box-Gum Woodland. The site consists of Blakelys Red Gum (*E. blakelyi*), Red Stringybark (*E. macrorhyncha*) and Broad-leaved Peppermint (*E. dives*) with native understorey of Sifton Bush (*Cassinia arcuata*), and several species of Acacia (*Ac. buxifolia, Ac. dealbata*) and Pultenaeas. There is clearing in the reserve for powerline and on the

disturbed edges there is weed invasion with English Hawthorn.

There is scope to undertake bush regeneration and create seating or picnic table in the cleared area.

f) Eusdale

Eusdale Recreation Reserve

Tarana Road Eusdale; Lot 7002, DP 1025708; Crown Reserve R20897 for Public Recreation, Council Reserve Trustee.

The large parcel of undisturbed bushland adjoins the Eusdale Nature Reserve. Whilst there is an access track into the Nature Reserve, there does not appear to be any formed access to the Recreation Reserve, with the legal access (paper road) via Tarana Road to the south west of the site.

The vegetation appears to be undisturbed and of high conservation value. It is mapped as being vegetated by Tableland Basalt Forest EEC, Box-Gum Woodland EEC (in two forms as Red Stringybark - Blakely's Red Gum - Yellow Box woodland and Scribbly Gum - Brittle Gum - Box Woodland and Scribbly Gum Woodland, both of which comprise Box-Gum Woodland EEC).

Council has advised that there have been past negotiations to transfer the management of the land to the Office of Environment and Heritage to form part of the Eusdale Nature Reserve. If it were to be retained, access needs to be investigated and addressed, along with weed spread, pest animal management, bush fire and fire ecology.

g) Caloola

Lachlan Road Bushland

Lachlan Road, Caloola; Lot 7003 DP1019728; Crown Reserve R78569 for Resting Place, management devolves to Council.

The small reserve adjoins a larger patch of remnant vegetation and is in good condition with few weeds present. The vegetation is mapped as Box-Gum Woodland with canopy species of Red Stringybark and Yellow Box (*E. melliodora*) and little understorey except native grass *(Poa sp*.) present, it is likely an example of Box-Gum Woodland EEC. There is evidence of previous logging, former benching of the land at the southern boundary near a dam with old machinery and a timber platform with brick piers being part of an old building. The land is heavily grazed by rabbits and kangaroos.

There is potential for an ecological burn of the site to promote regeneration. This could be investigated with the adjoining landowner.

h) Peel

Peel Old Quarry and Surrounding Bushland

Sofala Road, Peel; Lot 52 DP 728854, Operational Land.

The majority of the 11 ha site is remnant vegetation with clearing in the north-eastern corner of the land. The north-eastern corner has been used as a road base stockpile and there is a dam, tracks, gully erosion issues throughout on drainage lines, a row of planted Casuarinas near the dam, dumped garden vegetation near the dam, and dumped soil around base of trees.

The vegetation is Box-Gum Woodland with canopy of Red Stringybark, Long-leaved Box, Blakelys Red Gum and White Box, with understorey of Sifton Bush (*Cassinia arcuata*), Silver Wattle (*Acacia dealbata)*, and Native Plume Grass (*Dichelachne sp*.). There is a record of the threatened plant species, *Derwentia blakelyi,* in the vicinity. There is active soil erosion associated with two drainage lines which needs to be stabilised. Due to the presence of the EEC, its close proximity to the Peel Native Flora and Fauna Reserve and the low level of weed invasion, the site is considered to be of good ecosystem condition and conservation value.

Sofala Road Reserve

Sofala Road, Peel; Lot 6 DP 881183, Community land.

The small triangular shaped parcel of community land occurs on the edge of Sofala Road and immediately adjoins the Peel Native Flora and Fauna Reserve. The canopy includes Yellow Box, Apple Box, Blakelys Red Gum and Red Box, with a very diverse understorey of Hakea (*H. microcarpa*), Sunray *(Leucochrysum albicans)*, *Melichrus* sp.,

Lomandras (*L. longifolia* and *L. filiformis*), *Dianella prunina*, and native grasses *(Themeda australis, Echinopogon* sp.*, and Dichelachne crinita)* it is an example of Box-Gum Woodland EEC. There is no weed invasion however there is erosion along a track through the centre of the property.

Erosion within the site requires remediation, planting with native species and monitoring. There is potential to trial topsoil translocation within small areas.

i) Napoleon Reef

Hillview Reserve

Walang Drive Napoleon Reef; Lot 31-33 DP264498, Community land.

The 6 ha reserve spans the high point from the Ridgeway and Walang Drive, including the headwaters of a tributary of Saint Anthonys Creek and featuring remnant vegetation that is an important landscape feature. Mapped as Stringybark Box Gum Woodland, the canopy includes Red Stringybark, Red Box, Yellow Box and Blakelys Red Gum, with a range of native grasses and shrubs, it is potentially an example of Box-Gum Woodland EEC. The majority of the site is slightly disturbed with good habitat features including trees, hollows, fallen timber, rocks, understorey shelter and leaf litter, and has a good or very good ecosystem condition rating and conservation value. The significant bushland reserve provides for recreation and bushwalking. There are two powerlines and fire trails through the reserve.

Soil erosion is associated with the drainage lines and tracks and needs to be stabilised and revegetated. Weeds need to be addressed along drainage lines and under transmission lines. The Napoleon Reef Landcare Group have an interest in the reserve.

Walang Drive Small Reserve

Walang Drive, Napoleon Reef; Lot 1 DP 264498 Operational land.

The southern part of the small reserve is cleared for open space and the northern part is remnant vegetation. The vegetation is mapped as Stringybark - Box - Gum Woodland and the canopy on the site includes Red Stringybark, Yellow Box and Long-leaved Box, with understorey of Sifton Bush and Hakea, with ground covers of *Poa* sp., *Dianella prunina*, *Styphelia* sp. and *Juncus filicaulis*, with planted *Acacia buxifolia,* Callistemon and *Grevillea juniperina,* it is potentially an example of Box-Gum Woodland EEC.

The adjacent road construction has resulted in land modification in the reserve, and the subsequent planted bunds have stabilised. There is rubbish dumping due to the proximity to the adjacent road access. Track formation from the open space to adjacent properties needs to be discouraged and clean-up of dumped material should occur. Minor weed invasion by Cocksfoot should be addressed and any erosion issues monitored.

j) Trunkey Creek

Trunkey Creek Resting Reserve

Trunkey Road, Lot 7001 DP 1124534 Crown reserve R86990 for Resting Place, Council Reserve Trustee.

The small 2 ha reserve is located on a tributary near the junction with Mulgunnia Creek and adjoins a larger patch of remnant vegetation. Mapped as Box-Gum Woodland, the canopy consists of Blakelys Red Gum, Apple Box with several Mountain Gum (*E dalrympleana*), with an understorey of Acacias, Sifton Bush, and native grass (*Poa sp*.) . The reserve, although modified, has trees with hollows. There is degradation of native vegetation along the watercourse with weed infestation of Blackberry, Cotoneaster, Sweet Briar and willows.

There is potential for weed control through a prescribed ecological burn, with pre and post fire weeding.

Trunkey Creek Recreation Reserve

Arthur and Carlyle Streets Trunkey Creek; Lot 7310 DP 1142395 Crown Reserve R590131 for Public Recreation, Council Trustee; Lots 1 & 2 DP 758998 Operational Land.

The western part of the reserve is used for camping and sports whilst the eastern part is remnant vegetation mapped as Stringybark Box Gum Woodland and adjoins a larger remnant. The site had a recent hazard

reduction burn and has nest boxes installed. There are weeds in the lower disturbed part of the site.

Monitoring of post fire regeneration, and control of Blackberry and other weeds in consultation with the adjacent land manager is recommended.

k) Grovedale

Trunkey Creek Crown Reserve

Triangle Flat Road, Grovedale; Lot 7304 DP 1140389; Crown Reserve R81371 for Resting Place, with management devolved to Council.

The small narrow reserve is in near natural condition and was possibly part of an old road reserve. It adjoins Carrawa Creek near the junction with Grove Creek and forms part of a larger remnant. Mapped as Apple Box Yellow Box Mountain Gum Open Woodland, this is a form of Box-Gum Woodland EEC. Canopy species on the site include Mountain Gum, Apple Box and Red Stringybark with understorey of native herbs and grasses. There are a range of habitat features including rocks, trees, herbs, crevices, creeks, tall shrubs etc. Issues of firewood collection and campfires were present.

Native vegetation and woody debris should be protected, with impacts from campfires and firewood collection monitored.

l) Abercrombie River

Mulgunnia Recreation Reserve

Goulburn Road, Abercrombie River; Lot 7300 DP 1142397; Crown Reserve R80539 for Public Recreation, Council.

The narrow reserve of 8 ha is located at the junction of Mulgunnia and Trunkey Creeks. It consists of partially cleared open woodland mapped as Blakelys Red Gum Yellow Box Open Woodland, a form of Box-Gum Woodland EEC. Canopy consisted of large Yellow Box trees and Blakelys Red Gum with a heavily grazed understorey of exotic and native grasses and weeds. Evidence of former gold diggings included small rock walls and hummocks.

An investigation of land use arrangements should occur. If grazing is unauthorised, it should be removed to allow regeneration. Adjoining the reserve there is active creek bank erosion associated with the Goulburn Road Mulgunnia Creek crossing.

m) Wattle Flat

Wattle Flat Racecourse and Golf Course

Limekilns Rd Wattle Flat; Lots 223 and 317 DP 755803, Crown Reserve 95665, Council Reserve Trustee.

Half of the 52 ha reserve is cleared for racecourse and golf course in the north east and central area, with the surrounding land in natural condition connecting to a large area of remnant vegetation. The canopy consists of Blakelys Red Gum and Yellow Box, with Acacias in the shrub layer and an understorey of native grasses and everlasting daisies. Mowing of the cleared areas has resulted in a lack of recruitment of Eucalyptus. However, overall the site is in good condition with little weed invasion. The site has conservation significance as it is an example of the Box-Gum Woodland EEC.

The vegetation should be allowed to regenerate in the rough areas between fairways.

Wattle Flat Limekilns Rd Crown Land

Wattle Flat Limekilns Road; Lot 7003 DP 1025795, Crown Reserve R.82577 Wiagdon Resting Place, devolved to Council

The reserve is a small triangle of land on Big Oaky Creek, and forms part of a stepping stone linkage. Mapped as Stringybark Box Gum Woodland, the canopy consists of Yellow Box and Blakelys Red Gum, with Sifton Bush and native grass (*Poa* sp.) with low levels of weed infestation. The reserve has trees with hollows and fallen timber. The reserve has a record of the threatened plant species *Eucalyptus pulverulenta* in the vicinity, and is an example of Box-Gum Woodland EEC.

There is opportunity for regeneration of the reserve.

n) Sofala

Oaky Creek Camping Ground

Upper Turon Rd Sofala Camping area; Lot 519 DP 755790; Crown Reserve 1003528 for Public Recreation, Council Trustee.; Lot 108 DP 755790. Community land.

The riparian land is used as a camping ground and is vegetated by River Sheoak riparian woodland with a weedy understorey of Hemlock, Blue Heliotrope, *Lillium orientalis*, sheeps burr, and native grasses (*Poa sp.).*

The land upslope and south of the camping area is partially cleared and has open woodland adjoining steep slopes of the Turon River system. The vegetation is mapped as Tumbledown Red Gum - Black Cypress Pine - Red Box low woodland on hills. The canopy featured Tumbledown Red Gum (*E. dealbata*), with an understorey of Grevillea and isolated clumps of weeds, with rocky crevice habitat. The major threats to the site include the removal of dead wood, dead trees and logs for campfires and soil erosion.

Riparian restoration and weed control are recommended. Soil erosion should be addressed through strategies such as jute matting, mulch and ground cover plantings in a staged manner. Signage to discourage firewood collection should be installed.

o) Crudine

Coles Bridge Reserve

Turondale Road Crudine; Lot 8 DP 247729, Community Land; Lot 160 DP 756878, Lot 7006 DP 1050637. Crown Reserve R85022, Council Reserve Trustee.

The narrow reserves form camping and gold fossicking areas at Coles Bridge fronting the Turon River and include a turning area for vehicles exiting the road to access the river. The vegetation links to part of a north south band of open woodland vegetation. Mapped as Box-Gum Woodland EEC and River Sheoak riparian woodland, the canopy present includes Casuarina in the riparian zone and upslope Yellow Box Blakelys Red Gum Red Box (a form of Box-Gum Woodland EEC) with a grassy understorey and isolated weeds. A lack of recruitment however was noted. Habitat features within the reserve include trees with hollows, dead wood and rocks.

There is a need to address inappropriate recreation activities such as driving through the river, firewood collection, rubbish dumping, as well as grazing by sheep and goats. There is scope to formalise fireplaces, undertake riparian restoration and control willows, Blackberry and Tree of Heaven.

7.5.2 Cemeteries

Several cemeteries throughout the Bathurst Regional LGA contain remnant vegetation including Peel, Rockley, Trunkey Creek, Sofala, Hill End, Wattle Flat and Sunny Corner.

Peel Cemetery is located adjacent to the Peel Native Flora and Fauna Reserve. It is mapped as Stringybark Box Gum Woodland and has a native understorey and pasture species on the edges.

Rockley Cemetery is mapped as Tableland Basalt Forest EEC and has a canopy of scattered Mountain Gum and Apple Box with a partially mown native understorey. Invading weeds and exotic grasses should be spot sprayed.

Sunny Corner Cemetery is mapped as Tablelands Snow Gum Black Sallee, Candlebark and Ribbon Gum Grassy Woodland EEC. Blackberry and other invasive weeds should be managed across the property.

Where possible, rural cemeteries should be managed as natural bush cemeteries. Regular mowing operations should be limited to around graves and pathways to protect and enhance these vegetation communities.

7.6 NATIVE REMNANT VEGETATION MANAGEMENT

7.6.1 Guiding Principles

The factors that guide the development of strategies and recommendations for native vegetation have to address a diversity of issues covering cultural heritage, recreation, aesthetics, landscape protection and conservation. The diversity of issues poses

challenges to land managers, as a cohesive balance between all issues needs to be given to ensure values are retained and remnants are viable.

The guiding principles addressing native vegetation in the Bathurst Regional LGA are to:

- Preserve and enhance remnant native vegetation on the ridges and hillsides for the purpose of scenic protection, thus contributing to the rural identity of the Bathurst Region and offering visually pleasing vistas throughout the LGA;
- Recognise the objectives and relevant actions for National and NSW Threatened Species Recovery Plans;
- Utilise relevant recovery actions for threatened species under the Saving Our Species Program;
- Integrate recreational usage while protecting the natural and scenic resources of Mount Panorama and other recreational sites in the region;
- Ensure Council properly manages, develops, protects, restores, enhances and conserves the environment of the area for which it is responsible in its charter under the LG Act, and the EP&A Act. Vegetation is to be managed in accordance with the core objectives of natural areas – bushland under the LG Act;
- Council will prioritise native vegetation restoration of:
  - The largest, the least disturbed and zoned appropriately for their protection;
  - High conservation significance and of national, state, regional and local significance, including threatened species, Endangered Populations, Endangered Ecological Communities or Critically Endangered Ecological Communities;
  - Fauna habitat of core bushland and linkage corridors;
  - Eradication of priority weeds;
  - Works on a catchment basis so as to address areas at the headwaters of the catchment and drainage lines that are likely to be a source for further weed invasion;
  - Address key threats such as erosion;
  - Undertake bushland restoration in areas with active community involvement;
- Protect and enhance where practical the Box-Gum Woodland EEC, which is the predominant vegetation community in the Bathurst Regional LGA, Tableland Basalt EEC and other EECs on Council land;
- Seek opportunities for increasing the size of remnants or linking remnants to:
  - Reduce the existence of non-viable populations of plants and animals;
  - Provide wildlife corridors;
- Provide connectivity between significant areas of remnants and the riverine systems within the region;
- Support the community to engage with remnant native vegetation through interpretation, bushwalking, nature photography and restoration programs. This may require development and rationalisation of sustainable walking trails;
- Use fire as a tool for restoration of vegetation and wildlife habitat. Consider the potential to use fire in combination with herbicides and assisted bush regeneration for effective weed control;
- Where appropriate, use best practice techniques in burning, and apply scientific information on fire intervals, and variability of intensity and seasonality for vegetation communities and fire sensitivity for species where known;
- Enhance the resilience of remnant native vegetation to adapt to climate change by undertaking restoration, weed control and revegetation programs;
- Use locally endemic species for revegetation works; some sites may be best suited to local provenance with highly localised species, whilst others may utilise species and provenance from

the broader region to broaden the genetic pool to promote climate change resilience. Florabank guidelines (2018) on plant provenance recommend capturing high quality and genetically diverse seed in order to maximise the adaptive potential of restoration efforts to current and future environmental change, and matching of environmental conditions at the planting site with those of the collection location. Such decisions should be documented and sites monitored;

- Use emerging knowledge of climate change adaptation for native vegetation restoration and conservation at landscape scales. This would seek to include the goal of restoring landscapes to 30% native vegetation cover to improve future landscapes relative to current landscapes. It would also seek the restoration of priority corridors with local actions to match local goals (Doerr et. al, 2013);
- Monitor and address current, emerging and future issues, threats and trends that affect the conservation and restoration of remnant native vegetation.
    - To increase habitat area for native fauna;
    - Provide refugia in the landscape;
    - Provide linkages to allow for the connection of gene pools of native plants and animals;
    - Monitor and protect plant and animal dependencies and interactions;
- Protect and enhance the remnant vegetation in an endeavour to retain the characteristic Australian landscape of eucalypt woodlands;
- Protect areas of highest conservation value as less than 0.5% of the Box-Gum Woodland is estimated to retain pre-European levels of diversity and species composition (NPWS 2002a);
- Protect and enhance remnant vegetation for the conservation of threatened fauna species known to occur in the Bathurst Regional LGA;
- Explore a range of funding streams, programs and partnerships to assist in managing significant vegetation, where possible in perpetuity including investigation of Biodiversity Stewardship Agreements.
- Where possible, ensure that land dedicated to Council of conservation value is at no cost, and is in a size, shape and condition that will minimise the ongoing need for restoration and management, with land donor funding for restoration.

7.6.2 Strategies

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
OBJECTIVE 1: To manage the existing areas of remnant native vegetation to improve their environmental, recreational and visual qualities and attributes through protection and enhancement	
RV1 Maintain or enhance the diversity, structure and ecological integrity of remnants through the adoption and implementation of best management practices and recommendations.	• Work with land managers to promote and undertake native vegetation management and restoration, to develop shared programs and attract funding to implement best practice in bushland restoration of habitat enhancement; • Control or manage the dumping of garden refuse and litter into remnant vegetation areas; • Undesirable plant species are not be planted within or near areas of remnant vegetation (Refer Appendix D Species Lists); • Prohibit and enforce the policy of no collection of firewood; • Adopt grazing practices that allow for natural regeneration and reduce the potential for erosion; • Undertake weed control of priority weeds through assisted natural regeneration where resources allow; • Use online climate tools to predict the likely impact of climate change on weed abundance and distribution in the Bathurst Regional LGA; • Revegetate with endemic native upper-storey trees of local provenance where suitable; • Improve diversity and ecology of remnants with the planting of shrubs and encouraging native ground cover species; • Consider and document plant provenance for revegetation. This may require using diverse genetic material to enhance climate change adaptation, or using locally sourced seed as better suited to site conditions, or a combination of both strategies; • Retain standing dead timber, logs, rocks, leaf debris as valuable habitat resources for fauna. Reintroduce dead timber;

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
	• Consider the use of fire as a tool for regeneration of native species, habitats and communities. Manage prescribed burns to be low intensity fires, and patchy to create variability. Base fire regimes on the vegetation species present, fire history, current fuel load, practical fire boundaries, and available resources. Integrate weed control with fire management; • Maintain good ground cover to minimise risk of erosion; • Address areas with erosion issues; • Restrict unauthorised vehicle access in remnant vegetation areas. Log barriers or other device need to be considered; • Avoid unnecessary root and trunk disturbances to remnant trees, for example during road works and cultivation; • Do not lop tree branches, but prune branches if necessary using a qualified arborist; • Maintain isolated remnant trees to act as stepping-stones to other remnants; • Install and maintain nest boxes or augmented hollows where no natural hollows occur, monitor use, remove pest species and ensure fixing to trees does not ringbark, promote insect attack or fungal decay; • Exclude stock if possible through fencing/change of management or land use. Use controlled grazing of vegetation where it meets a recovery action for a threatened species; • Do not remove remnant trees unless threatening life or property. First consider options such as removing offending branches using proper arboricultural practices; • Liaise with adjoining land owners to promote complementary vegetation management. • Remove litter, garden refuse, dumped household materials etc.; and • Erect signs where littering, the dumping of garden plants and rubbish, and the collection of firewood is commonplace to dissuade these practices.
RV2 Enhance the extent, viability and diversity of native grasses and groundcover plants where they	• Restrict the slashing of the native grasses in remnant vegetation areas; • Restrict vehicle access with the use of barriers if necessary;

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
occur.	• Manage weeds; • Remove grazing, except where required as part of a threatened species recovery action; • Prevent the illegal dumping of rubbish and garden refuse; • Prevent the collection of firewood; • Slashing that is required to be undertaken following peak flowering and seed set; and • Educate community (particularly those in vicinity of remnants) about low fire risk of native grasses and their value.
RV3 Future development not to significantly threaten or negatively impact on remnant vegetation.	• Where the outcome of a proposal on native vegetation is uncertain, apply the precautionary principle in accordance with ecologically sustainable development; • Ensure developers have a clear understanding of the planning provisions in relation to the protection or enhancement of native vegetation; • Undertake on-going monitoring to assess conservation areas and to set adaptive management plans for their continued long-term protection; • Control and manage pest, weeds and where possible pathogens identified as being of significance; • Continued community education and awareness programs aimed at limiting the introduction of pests and weeds into native vegetation areas; and • Where suitable, revegetate the upper-storey trees species with endemic native species of the local provenance.
RV4 Compile an inventory of endemic native plants found in the varying landscapes in the Bathurst Regional LGA.	• Inventory designed to be repeatable, so monitoring can be undertaken. • Use online climate change tools to assess the vulnerability of plant species to climate change, particularly threatened species.
RV5 Continually monitor the	• Areas under the greatest pressure, or remnants showing signs of decline, undertake surveys more regularly

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
condition of the remnant vegetation, ensuring its on-going sustainability through targeted management actions.	than more stable communities.
RV6 Review management recommendations in relation to existing areas of remnant vegetation as appropriate.	• Management recommendations are reviewed as projects are designed and delivered to ensure they are achieving intended conservation objectives.
RV7 Develop specific management plans for key reserves with remnant vegetation.	• Include relevant strategies from RV1-RV6. • Compile an inventory of native and exotic plants within the reserve. • Establish and maintain monitoring within the reserve such as photo monitoring points. • Update existing reserve management plans as required.
RV8 Develop a list of native plant species suitable for revegetation projects under future climate predictions.	• Use online climate tools to predict the tolerance of native plant species for projected climatic change. Consider alternatives if local species are unlikely to be suitable.
OBJECTIVE 2: To protect and conserve Boundary Road Reserve for the purposes of conservation, passive recreation, scenic protection and a buffer from the Mount Panorama race track	
RV9 Recognise, support and implement the on-going management and recommendations in accordance with the Boundary Road Reserve	• Boundary Road Reserve be fully protected from development or change in land use; and • Continue support of the Boundary Road Reserve Landcare Group.

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
Management Plan.	
OBJECTIVE 3: To protect and conserve the remnant vegetation on Council lands inside Mount Panorama track (south and south-west corner only) within the scope of future development and the precinct being used for motor racing	
RV10 Ensure all development proposals likely to impact on remnant vegetation fully consider the conservation value of this area and all efforts be made to protect and conserve it.	• The remnant vegetation constitutes an EEC or CEEC as defined in the BC Act and as such has high conservation value. Its conservation value needs to be fully recognised; • As a means of legally protecting the EEC or CEEC any development assessment governed by the EP&A Act needs to consider this community; and • All development proposals are to firstly seek to avoid impacts on the EEC or CEEC vegetation, then minimise then offset the unavoidable loss of vegetation, in accordance with the BC Act.
RV11 Undertake measures to protect and conserve the area.	• Undertake further investigation of the potential occurrence of Tableland Basalt Forest EEC identified on Mount Panorama; • Ensure replanting or tree replacement use species that are endemic to the area. • Consider Aboriginal heritage before embarking on any revegetation or restorative projects; • Restrict unauthorised vehicle access to retain good ground coverage of grasses and forbs for the purposes of controlling water and gully erosion and for conservation of the existing native plants; • Maintain weed control, especially on weeds such as Sweet Briar, Cotoneaster, Blackberry, Hawthorn and African Boxthorn. Variegated Thistle, locally prolific also to be controlled; • Any seedlings and juvenile Radiata Pine be destroyed; • Contractors/Council responsible for litter control and clean-ups undertake complete rubbish removal from remnant vegetation areas inside the track; • Where the outcome of a proposal on native vegetation is uncertain, apply the precautionary principle, consistent of ecologically sustainable development; • Ensure developers have a clear understanding of the planning provisions in relation to the protection or

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
	enhancement of native vegetation; • On-going monitoring to assess conservation areas and to set new recommendations within the VMP if appropriate; • Control and manage pests and weeds, and where relevant possible pathogens, identified as being of significance; • Conduct community education and awareness programs aimed at limiting the introduction of pests, weeds and pathogens into native vegetation areas; • Where suitable, revegetate with only endemic native species of the local provenance (particularly the upper-storey tree species); and • Develop site specific action and implementation plans to provide for the long-term protection and regeneration of remnant vegetation at Mount Panorama, where possible.
OBJECTIVE 4: To enhance and protect the remnant vegetation on Council lands on the "Top of the Mount' within the scope of future development and the precinct being used for motor sports	
RV12 Investigate options to ensure the sustainability of the remnant vegetation during the course of development with site specific landscape and vegetation management plans that compliment land use for motor racing.	• Plans to be detailed with specific measures to protect and enhance the remnant vegetation in relation to all development proposals; • The VMP to prevail over landscape and vegetation concept plans associated with individual developments; • Vegetation to provide recreational and visual amenity value that compliments the land use for motor sports; • Should planting opportunities exist, new plantings to be strategically placed to reduce the risk of vandalism, to maximise amenity value, to provide buffer zones, to prevent view obstruction, not to hinder future development for infrastructure and to provide the best links with other remnants; • All trees to be endemic to the area. Shrubs and groundcover plants used for landscaping to be native, but not necessarily endemic as the diversity is too limited; • Plans to accommodate for the full protection of new plantings to ensure their survival; and

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
	• As well as other interrelated issues, the plans need to recognise the value of remnant vegetation, the EEC/ EECs, threatened species habitat, local occurrence of mountain gums, environmental value of native grasses *in situ,* and other native species, and the scenic and amenity values of the vegetation.
OBJECTIVE 5: To enhance and protect the remnant vegetation on Council controlled land on Mount Panorama environs within the scope of future development and the precinct being used for other land uses	
RV13 Plan for the enhancement and protection of remnant vegetation in the rifle range while maintaining its existing sporting land use.	• Continue to protect the steeper gradients from livestock to encourage natural regeneration; and • Maintain weed and pest control.
RV14 Maintain a conservation link of high value remnant vegetation from Boundary Road, along the western and southern face of Mount Panorama to Vale Road.	• Refer Map E1; • Restrict stock access to vegetation corridors; • Revegetate where necessary. In areas with good stands of existing trees or of good resilience, allow and encourage natural regeneration; • Plant with endemic species only; • Connect areas of highest conservation value as practically as possible; • Maintain the conservation link created within Albens Reserve; • Create the remainder of the linkage subject to the development of the proposed Second Race Track; and • Corridor not to restrict the pursuits of the rifle range users.
OBJECTIVE 6: To restore the remnant vegetation in Peel Village Operational Land to control erosion and enhance the condition of the Box-Gum Woodland Endangered Ecological Community and provide habitat for native flora and fauna	

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
RV15 Restore and protect native vegetation from erosion and weed invasion in the Peel Quarry and surrounding bushland to provide for conservation of Box-Gum Woodland and wildlife habitat.	• Investigate the sources of significant active erosion in the reserve and develop strategies to remediate and stabilise erosion appropriate to the sensitive bushland environment; • Prepare appropriate strategies to address future water runoff from the surrounding cleared land, overflow from dams and road; • Consider recovery actions for threatened species when planning revegetation and restoration works. • Plan a planted buffer around cleared land in north-east corner; • Undertake erosion control, bank stabilisation and revegetation works; • Undertake ongoing bushland regeneration and monitoring; and • Manage the reserve as a connected entity along the Peel Native Flora and Fauna Reserve and in cooperation with the Peel Native Flora and Fauna Management Committee.
OBJECTIVE 7: To restore and enhance the vegetation in Hillview Reserve, Napoleon Reef, by addressing degraded parts of the reserve, stabilising erosion and undertaking weed control associated with drainage lines, transmission line corridors and recreational areas	
RV16 Investigate and prepare a plan to remediate erosion and undertake restoration works to protect native vegetation at Hillview Reserve and provide for environmental protection, bushland conservation, access and passive recreation.	• Prepare a remediation plan to stabilise erosion within the reserve with strategies appropriate to the sensitive bushland environment; • Ensure that infrastructure within the reserve does not contribute to degradation of native vegetation and waterways within the reserve. Coordinate with powerline trail owners; • Consider recovery actions for threatened species when planning revegetation and restoration works; • Undertake weeding of areas outside the active erosion including bushland regeneration under transmission lines; • Source and propagate endemic species for revegetation works; • Undertake review, rationalisation and upgrade recreational bushwalking trails in the reserve; and

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
	• Implement the Ecological Burn Plan for Hillview Reserve.
OBJECTIVE 8: To increase the extent of fragmented remnants by linking and creating vegetation corridors to provide for their ecological sustainability and function as wildlife corridors and recreational areas	
RV17 Link remnant vegetation areas through the urban landscape.	• Refer to Map E for proposed links; • Use a diverse array of endemic species; • Incorporate natural features such as existing drainage lines, fallen logs, and outcrops; • Develop as much structural diversity as possible (i.e. trees, shrubs and groundcover species); • Retain any standing dead timber and reintroduce dead timber to provide habitat; • Widths of newly created links should be as wide as possible; • Where recreational trails are present, work with recreational users to develop well designed high quality recreational trails that minimise impacts on native vegetation, soil stability and impacts on wildlife. Trail redesign or rationalisation may be required; and • Note: Details on waterway linkages are addressed in Section 8.
RV18 Link and restore remnant vegetation areas in rural and village areas.	• Where possible connect areas of highest conservation value, addressing threats such as weed invasion and firewood collection to allow natural regeneration; • Work with adjoining landowners and land managers to conserve, restore and manage reserves and linkages of high conservation value; • Where planting is required use a diverse array of endemic species. Consider plant provenance with respect to climate change; • Incorporate natural features such as existing drainage lines, fallen logs, and outcrops; • Develop as much structural diversity as possible (i.e. trees, shrubs and groundcover species);

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
	• Retain any standing and fallen dead timber. Reintroduce dead timber; • Clearly define recreation and conservation areas to delineate land use on the ground; • Restore areas of environmental degradation especially soil erosion; • Consider the use of fire as a tool for regeneration; • Consider the use of nest boxes or hollow augmentation where hollow bearing trees are absent; • Nest boxes or augmented hollows are to be installed to not create tree defects (decay, promote insect pests, ringbark) and are to be monitored and maintained; • Widths of newly created links should be as wide as possible; • Undertake pest animal control to reduce herbivory (rabbits, pigs, goats) or predation (foxes, cats); • Coordinate weed control with recreational use such as camping; • Progressively undertake weed control and revegetation of hillslopes; consider the use of brushmatting or jute matting to minimise potential for erosion; and • Install signage prohibiting the collection of firewood.
RV19 Protect and enhance remnant vegetation within rural cemeteries.	• Update the Conservation Management Plans for the rural cemeteries to include management measures to retain and enhance native vegetation. Mowing of major paths and around graves only is recommended. Other activities to include weed control, rabbit control, flora inventories, and the installation of educational signage to provide detail on the vegetation communities and flora.
OBJECTIVE 9: To protect and enhance remnant vegetation on the rural road reserves.	
RV20 Implement the Roadside Vegetation Management Plan.	• Undertake regular monitoring of roadsides and note areas of remnant vegetation, their condition, composition and connectivity to other remnants; • Implement actions in the Roadside Vegetation Management Plan to mitigate identified threats and undertake

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
	revegetation and weed control as resources allow; • Restrict areas suitable for works compounds, stock pile sites etc. to those identified in the plan; • Implement management recommendations in accordance with the findings; and • Review and adapt the plan as required.
OBJECTIVE 10: To reflect the objectives of protecting, enhancing and increasing the area of native vegetation through implementing existing planning provisions and reserve management rules	
RV21 Review and amend local planning provisions to accommodate for native vegetation protection and enhancement.	• Regulate and enforce controls within the legislative framework to protect biodiversity; • Inform development proponents of their legal responsibilities in regards to protecting migratory and threatened species, populations or ecological communities or their habitats in the EPBC, BC and FM Acts; • Enforce provisions and development control standards in existing, new and amended environmental planning instruments; • Implement controls within the LEP and DCP to protect and enhance native vegetation, minimise the impacts of clearing, land degradation or from development pressures, and promote the protection of corridors; • Suitably inform community of key environmental messages/regulations at campsites, recreational and open space areas on Council controlled land; and • Continue with existing initiatives and incentives and develop new ones that aim to protect biodiversity and its environment.
OBJECTIVE 11: Educate and increase awareness within the community on the function and value of remnant native vegetation and the threats to its sustainability	
RV22 Educational programs and material developed and	• Collaboration between state and local government agencies, and the community is required for education and capacity building;

Table 5 Native Remnant Vegetation Strategies	
Strategies	**Recommendations/Guidelines**
disseminated to targeted community groups.	• Provide the community with an on-going program of education and awareness initiatives developed to foster an appreciation of the remnant vegetation and habitat values; and • Install interpretive signs and develop sustainable walking tracks where there is demand for bushwalking to promote the appreciation of native vegetation.
OBJECTIVE 12. Manage bushfire risk on Council controlled properties while ensuring ecological values are protected and enhanced.	
RV23 Implement appropriate fire strategies in areas of remnant vegetation.	• Implement the Ecological Burn Plans for Brooke Moore Reserve and Hillview Reserve. • Investigate the preparation of Ecological Burn Plans for other Council reserves that contain remnant vegetation, including Boundary Road Reserve; and • Where relevant, include actions that benefit the dual objectives of bush fire risk management and conservation of remnant vegetation, and where known consider vegetation community fire intervals and the fire sensitivity of threatened species.
OBJECTIVE 11. Manage and interpret heritage sensitively within areas of remnant vegetation	
RV24 Assess, conserve and interpret Tambaroora Racecourse within significant remnant vegetation	• Undertake an assessment of heritage, historic analysis, inventory and heritage works schedule within the context of high conservation value vegetation; and • Apply for grant funding and other opportunities to undertake works.

7.6.3 Actions

Table 6 Native Remnant Vegetation Actions		
Action	**Strategy Identifier**	**Importance Ranking (1-highest, 4-lowest)**
Manage existing areas of remnant vegetation using best management practices.	RV1	1
Enhance the extent, viability and diversity of native grasses and groundcover plants where they occur.	RV2	2
Continue to compile an inventory of endemic native plants found in the varying landscapes in the Bathurst Regional LGA.	RV4	3
Continually monitor the condition of the remnant vegetation, ensuring its on-going sustainability through targeted management actions.	RV5	3
Review management recommendations in relation to existing areas of remnant vegetation as appropriate.	RV6	3
Develop specific management plans for key reserves with remnant vegetation.	RV7	2
Undertake measures to reduce the impact to remnants within the Mount Panorama Precinct where possible and consider remnant conservation measures with any future development.	RV11, RV13	3
Maintain a link of native vegetation from Boundary Road along the western and southern face of Mount Panorama to Vale Road.	RV14	4
Restore native vegetation from erosion and weed invasion in the Peel quarry and surrounding bushland to conserve Box-Gum Woodland habitat.	RV15	1
Prepare remediation plan and undertake restoration works to restore and enhance the vegetation in Hillview Reserve, Napoleon Reef	RV16	1

Table 6 Native Remnant Vegetation Actions		
Action	**Strategy Identifier**	**Importance Ranking (1-highest, 4-lowest)**
Link remnant vegetation areas through the urban landscape	RV17	2
Link remnant vegetation areas in rural and village areas	RV18	3
Update the Conservation Management Plans for the rural cemeteries to include measures to retain and enhance native vegetation.	RV19	2
Implement the Roadside Vegetation Management Plan	RV20	3
Revise and amend local planning provisions to accommodate for native vegetation protection and enhancement.	RV21	2
Educational programs developed and disseminated to targeted community groups.	RV22	3
Implement the Brooke Moore Reserve and Hillview Estate Reserve Ecological Burn Plans	RV23	3
Undertake heritage assessment at Tambaroora Racecourse, Hill End	RV24	3

8 WATERWAYS

8.1 VISION

Rivers, creeks, flow lines and drainage lines all function in supporting natural ecosystems, meeting community needs, and sustaining catchment health in terms of water quality, desirable surface hydrology, conservation and landscape protection.

8.2 INTRODUCTION

Waterways within the Bathurst Regional LGA are fed from two major catchments, the Macquarie and the Lachlan. The Macquarie, Turon, Campbells and Fish Rivers drain to the north west and the Isabella and Abercrombie Rivers drain to the south west. Permanent and ephemeral, named and unnamed creeks also contribute to the watercourses of the Bathurst Regional LGA, all of which ultimately flow into the Macquarie or the Lachlan Rivers.

This section provides the context of waterways within Bathurst Regional LGA. It then focusses on the condition and actions that are relevant to the VMP, Council lands, and where waterways flow through the City, villages and rural areas. It also includes the significant drainage lines and drainage reserves, within/or impacted upon by the urban environment.

Watercourse restoration and management is a long-term objective with many activities needing to be staged over a period of decades before desired outcomes are realised.

MAP REFERENCES

Map A – Vegetation Themes

Map B – Significant Vegetation and Natural Landscapes

Map C – Remnant and Riparian Vegetation

Map D - Remnant and Riparian Vegetation Condition Ranking

Map E – Site Specific Projects

8.3 BACKGROUND

8.3.1 Context of Bathurst Waterways

The likely pre-European condition of Bathurst was described by Cenwest (2010) in the Bathurst Urban Waterways Management Plan. The upper catchment valley depressions within the former Bathurst City LGA would have likely been broad open 'U'-shaped valley depressions contained within the undulating hills of the weathered Bathurst Basin. For Vale Creek the plateaux regions near Caloola would have produced broad open valley depressions. Around Rockley the valleys would have been narrow and steep, vegetated by open Box-Gum Woodlands with the valley-floor being periodically moist.

The lower slopes would have consisted of continuous or discontinuous Swampy meadows in the drainage lines occurring on Bathurst Soil Landscape soils of sediments and organic material. The mid to lower reaches would have formed a continuous sinuous channel forming the main trunk of the creeks, including channels, small pools and sediment bars. These reaches would have been densely vegetated with water-loving plants and Box-Gum Woodlands, including Ribbon Gum.

Vale Creek's two major tributary streams, Georges Plains Creek and Sandy Creek, drain vast catchment areas and converge at Georges Plains. These watercourses were likely to have been sinuous streams in broad alluvial floodplains extending to the lower reaches of the creek. The two streams would have had a dense cover of fringing macrophytes, with open pools vegetated by submerged and floating plants. The floodplain, flood runners and backswamps would have likely been swampy and vegetated possibly with macrophytes, tussock grasses and scattered riparian shrubs such as Tea-tree and Bottlebrush.

The lowland channels in the low valley slopes of the Macquarie River floodplains would have most likely spread out into multiple swampy channels and reed beds. River Sheoak may have formed floodplain woodlands and fringing riparian forest.

The impact of early settlement on the riparian vegetation was considerable, with accounts by Lesson (1824, cited in Cenwest 2002) describing the banks of the Macquarie as being "wholly" European plants (CSU 2000). Later In 1902, the Bathurst Post (CSU 2000) noted that the original fringing vegetation of "Swamp Oaks" (River Sheoaks) on both banks had disappeared due to soldiers and citizens who tore down the branches to provide cheap and effective brooms. Removal of the trees soon resulted in bank destabilisation.

Further pressure on the watercourses has been felt in the catchment with the advent of agriculture, land clearing, rabbits, grazing, development of urban areas and infrastructure and river regulation. Some of these changes have bought about significant physical changes, such as the changed course of Queen Charlottes Creek from the old Vale Creek due to the development of the railway (CSU 2000). The Vale Creek channel on the lowlands was diverted in 1933 with the original flow path converging with the Macquarie River near the showground.

Gold mining in creeks and reefs, pastoralism and cropping have caused significant impacts to occur in other riparian systems within the Bathurst Regional LGA.

In 1814 Evans described the Fish, Campbells and Macquarie Rivers as *'running over hard gravel bottoms*'. In 1824 Lesson considered the Fish River bed further upstream as '*uneven, composed of great granite boulders which presented rather deep ponds while its waters flowed in a murmuring sheet in other places. Downstream the riverbed consisted of granite pebbles'*.

Lesson's description of the river bed at Bathurst was pebbly or of soft mud. Even in a dry season Macquarie described the river at Bathurst as 'clear and beautiful'. More than one journal expressed surprise at the lack of widening of the Macquarie river bed at the junction of the Fish and Campbells River. This suggests that the Macquarie must have deepened at this point. In 1815 Macquarie made the following comments on Campbells River: '*judging from the height of the banks and its general width the Campbells River must be on some occasions of considerable magnitude'* and in 1824 Lesson described the banks of the Macquarie River at Bathurst as ten to twelve feet high (3 - 3.6 m) and formed by the alluvium itself.' (1827, cited in Cenwest 2002 as possibly authored by Captain Dumaresq) mentioned the Lagoon at Mitchell's Plains as '*the placid and peaceful lake at the bottom covered with wildfowl*'.

The Campbells River flows from the western slopes of the Great Dividing Range and is dammed by the Chifley Dam forming Bathurst's water supply. At its confluence with the Fish River it become the Macquarie River. The Campbells and Fish Rivers form a large part of the eastern boundary of the LGA.

Originating to the north east of Bathurst, the Turon River flows through the Turon National Park and west. It is noted for its gorges in the upper reaches and below from Bruinbun to the Macquarie River Junction and is characterised by wide reaches fringed by casuarinas, long reaches with sandy beds and deep pools. Rocky, hilly country rises fairly steeply from the Turon River with some of the bluffs along the way providing scenic views. It is known for rapids, races and long pools.

Forming the southern boundary of the LGA, the Abercrombie River rises in the Blue Mountains National Park near Mount Werong and flows west into Lake Wyangala and then into the Lachlan River. It drops approximately 750m in elevation across its length. It is characterised by deep rocky pools, riffles and small complex rock piles. The water quality of the Abercrombie River is recognised as being the highest quality water flowing into the Lachlan River. This is largely due to the large quantity of native vegetation in the catchment; including extensive areas of riparian vegetation with River Sheoak as the dominant species. However, during high rainfall events the Abercrombie River does experience high sediment loads as a result of natural processes and farming and forestry clearing practises. Platypus have been regularly recorded in the Abercrombie River and its tributaries. In addition, the Abercrombie River and its tributaries provide habitat for three threatened fish species listed under the FM Act)*:* the Endangered Trout Cod (*Maccullochella macquariensis*) and Macquarie Perch (*Macquaria australasica*); and the Vulnerable Silver Perch (*Bidanuss bidyanus).*

8.3.2 Key Waterways

a) Macquarie River

The Department of Primary Industries (Fisheries) (2016) carried out extensive habitat mapping along the Upper Macquarie River from its commencement at the confluence of the Fish and Campbells River to Eglinton. As part of the project, aquatic and riparian habitat features were recorded through an onsite survey, digitised and then analysed against benchmark conditions. Mapping is currently underway for the reaches downstream of Eglinton.

The study found that native riparian vegetation condition was poor throughout the Upper Macquarie River, with very few intact sections of native vegetation. Exotic species dominated most of the riparian zone, with Willows being the most abundant species, followed by Blackberry. Where it was found, native vegetation consisted of River Sheoak (*Casuarina cunninghamiana),* which was regenerating in some reaches. Understorey native vegetation was completely absent, while groundcovers consisted mostly of exotic grasses and forbs, with some clumping native grasses. Where the river ran through Bathurst and Eglinton, a large amount of riparian weed control had been undertaken and, in many places, followed up with planting of a range of native riparian plants and trees. Follow up weed control is required.

Large woody habitat, a valuable habitat for aquatic species, was recorded as low throughout the Macquarie River.

There is a higher than normal fine sediment load within the Macquarie River, as a result of landscape scale land clearing, as well as reduced intensity and duration of high flows released from Ben Chifley Dam. A low abundance of drought refuge holes was also recorded, which is most likely associated with fine sediment filling the deeper pools.

Livestock exclusion fencing occurred along a large proportion of the river, resulting in relatively low bank instability and damage caused by livestock trampling.

Erosion was more common along sections of the river adjacent to developed areas of Bathurst City. The most common types of erosion were bank scour and block failure, usually on the outside of large bends or where vegetation was growing in the stream channel.

b) Creeks in the Macquarie River Catchment

Six of the urban creeks within Bathurst City were assessed within the Bathurst Urban Waterways Management Plan (Cenwest 2010). The plan has been partially implemented and condition assessments are undertaken every 4 years to monitor the waterways, identify threats and evaluate restoration works. A similar plan has not been prepared for the waterways within the rural areas and villages of the Bathurst Regional LGA.

Sawpit Creek

Sawpit Creek has been identified for its potential environmental, recreational, and cultural significance to provide:

- An appropriate buffer between the urban and rural interface from the approach along the Mitchell Highway. As urban expansion extends towards Mount Stewart, other drainage lines can be considered similarly;
- A containment line for the neighbouring residential estate (not precluding further development towards Mount Stewart);
- The only link between sizable patches of remnant vegetation and the Macquarie River within the whole of the Bathurst City;
- A significant wildlife corridor from the existing remnants to the river;
- Potential valuable habitat features for native fauna;
- A potential location for cycle ways and access paths between the Mitchell Highway and the river;
- An open space for the Windradyne / Llanarth residential development (DCP)
- A passive recreation area for the local neighbourhood and Bathurst community;
- The primary channel for stormwater entering the Macquarie River from the Sawpit residential development;

- A filter for sediments and other pollutants from the large catchment in the urban landscape;
- A natural environment for aesthetic appeal in an urban subdivision; and
- Contribution to the rural identity of Bathurst City and to the neighbourhood.

The creek flows into the Macquarie River near Jubilee Reserve between Eglinton and Abercrombie House and has a catchment that extends to the Boundary Road Reserve, Robin Hill and Cherry Hill Estates.

Remnants of Yellow Box, Apple Box, Blakely's Red Gum and Ribbon Gum are scattered along the drainage line, with their distribution and abundance being variable. Degradation of the remnant vegetation from the Mitchell Highway to the river is a result of previous clearing, lack of recruitments, colonisation with willows, woody weed invasion, groundcover modification and continued pressures from grazing.

The Urban Waterways Assessment Update (Mactaggart 2014) described Sawpit Creek as mostly degraded to poor with the main trunk of Sawpit Creek improving in condition. Some sections were in good condition. The key problem areas within the catchment are the lateral valleys (tributaries), where gullying has occurred, riparian vegetation has been lost, and erosion and sediment movement is still active. Grazing and cultivation are not employing soil conservation practices and are still impacting on waterway recovery. In 2007/8 stream rehabilitation works were undertaken in the section of Sawpit Creek between the Mitchell Highway and Munro Street, with the construction of rock structures in the main channel and revegetation of the riparian zone.

Jordan Creek

The Urban Waterways Assessment Update (Mactaggart 2014) described a large part of Jordan Creek as highly degraded where it passed through the older part of Bathurst City. The creek had little ecological value due to significant engineering and highly modified hydrology and hydraulics, stormwater runoff and pollutants from the urban streets. The condition of the upper reaches was mostly degraded or poor, with weed invasion, valley gullying and/or poor riparian vegetation. Restoration works, including weed control, revegetation and erosion control, within Browning Street Reserve and Blayney Road Common have resulted in a positive change in condition in these reaches of the waterway. The engineered pool - riffle system in Hector Park was in good condition.

Hawthornden Creek

The Urban Waterways Assessment Update (Mactaggart 2014) described Hawthornden Creek as having a variable condition along its length. The tributary drainage lines are generally degraded in condition as they drain from agricultural land. Riparian vegetation and instream habitat was generally very poor with active erosion, sediment and nutrient transport except in some piped sections. The better condition reaches and those improving in condition are within reserves, have been stabilised using engineering solutions, have been revegetated and are being protected and enhanced.

Reducing sediment and nutrient loading into the creek is a key issue for targeted management. Minimising flood peaks through stormwater management and retention, enhancing conservation linkages and reducing localized flooding are also important management considerations.

Saltram Creek

The Urban Waterways Assessment Update (Mactaggart 2014) described Saltram Creek as primarily degraded in condition due to past and present impacts of agriculture. These land uses, particularly catchment clearing and increased runoff, have caused severe hillslope erosion, gullying, active gully bank and bed erosion, modification of groundcover composition, general loss of riparian vegetation, loss of swampy meadows and an alteration of the hydrology and hydraulics. Willow removal on Eleven Mile Drive and the confluence of the Macquarie River has resulted in a condition improvement in these reaches.

A significant proportion of Saltram Creek is on privately owned agricultural land and management to reduce the movement of sediments into the waterway is critical in these areas. On Council lands the key issues are to manage sediment in the lower reaches through

the installation of sediment basins or instream structures, revegetation of the riparian zone, and to incorporate open space and multi-use access linkages.

Raglan Creek

The Urban Waterways Assessment Update (Mactaggart 2014) describes Raglan Creek tributaries as generally in a poor to degraded, but stable condition. The waterway is highly modified; with the source of the upper tributaries in agricultural land greatly impacted by grazing stock and cropping. Highly dispersible subsoils were exposed in the valley depressions which resulted in many upper tributaries with gully erosion, lost riparian vegetation and habitat, and altered floodplain connections and hydrological function. In the built environment the creek was engineered into channels, low flow pipes and culverts, detention basins and with exotic weed trees, shrubs and groundcovers.

Where the creek enters the floodplain all tributaries were diverted and concentrated into one channelised stream, with grazing, dredging and cropping in close proximity to the streambank. Issues that were present included:

- Woody weeds that have established on banks and in the creek bed restrict ground-cover growth and native species diversity;
- Erodible granite creek banks, in some areas, contain no ground cover and are subject to scouring and slumping;
- Stormwater run-off from roads and other non-porous surfaces transports urban pollutants to the creek;
- In upper areas of the sub-catchment grazing stock have access to the creek, which increases erosion; and
- The future management of Raglan Creek is complex and comprises riparian vegetation and instream habitat enhancement, urban planning controls, developing collaborative partnerships, regulatory action, land acquisition, flood management, public education, improving visual amenity and public accessways and integrating ecology with engineered structures.

Vale Creek

The overall condition of the main trunk of Vale Creek as reported in the Urban Waterways Assessment Update (Mactaggart 2014) was generally poor and is impacted by land use practices in the upper catchment areas. Reduced cover of vegetation had increased erosion and peak flow discharges and contributed to the movement of large volumes of sediment through Vale Creek, channel deepening, the loss of instream habitat, reduced water quality and altered hydrology. There has been loss of native canopy trees and willow invasion.

Management in the Vale Creek sub-catchment should target sediment movement through the system by addressing land management in the upper catchment areas beyond the former Bathurst City LGA and exclude stock from the main trunk of Vale Creek. For the tributary streams, the focus is more directed towards enhancing the riparian vegetation and stabilising bed and banks.

Saint Anthonys Creek

Where a tributary of Saint Anthonys Creek flows through Hillview Reserve at Napoleon Reef, significant streambank erosion occurs near transmission lines and an access track.

Key issues for management include stabilising the creekline, addressing stormwater and drainage, revegetation and track rationalisation.

Winburndale Rivulet

Tributaries of Winburndale Rivulet at Peel have had concentrated flows from road culverts resulting in significant gully erosion in the Peel Quarry and surrounding bushland affecting an example of Box-Gum Woodland EEC.

Erosion control, stabilisation and revegetation are key focus areas for management.

Clear Creek

Within the upper reaches of a tributary of Clear Creek, where it occurs in the operational land at Peel, there is significant erosion gullies evident. The creek is also subject to clearing, weed invasion and road culverts.

The key areas for future management are the control of erosion, weed management and revegetation of banks.

c) Abercrombie River Catchment

Peppers Creek

Peppers Creek is in poor condition due to clearing in the catchment, loss of riparian canopy and understorey vegetation, riparian weeds, presence of willows and elms in the riparian zone, mowing and spraying in the riparian zone, and damming of water in the weir.

Management should control tree weeds and woody weeds from the riparian zone as well as the planting of native vegetation including shrubs, grasses and sedges.

Trunkey Creek

Loss of riparian vegetation especially canopy and infestation by willows has impacted heavily on the operational land on Trunkey Creek in the village.

Weed control, and revegetation of the riparian area should occur.

Mulgunnia Creek

The creation of culverts under roads has resulted in active erosion at the junction of Trunkey and Mulgunnia Creeks in Mulgunnia Recreation Reserve. Within these areas there is disturbed riparian vegetation and weed understorey of Blackberry, Cotoneaster, Sweet Briar and Willow.

Stabilising erosion, mitigation of the impacts of stormwater, weed control and revegetation works should occur.

d) Turon River Catchment

Turon River

Loss of canopy and riparian vegetation, presence of willows and elms and historical clearing degraded the riparian zone has impacted the Turon River at Sofala. Note that this area is subject to flash flooding.

Other recreational sites used for gold fossicking and fishing are impacted by 4WD vehicles accessing the river, such as the camping grounds at the Turon River at Coles Bridge Reserve Turondale. This has resulted in bank instability and undercutting, clearing of tree canopy, weed invasion and collection of firewood. Feral animals such as pigs and goats degrade the riparian vegetation. Note that this area is also subject to flooding.

Recreational camping, firewood collection, weed invasion, and clearing in the catchment have impacted on Oaky Creek Camping Area and Lucky Strike Camping Area on the Turon River at Sofala.

Big Oaky Creek

Big Oaky Creek at Wattle Flat Racecourse has been filled for recreational purposes resulting in loss of natural stream morphology and complexity.

e) Actions Completed

Under the original vegetation management plan, a Willow control and replacement program has been put in place and restoration works have been carried out as funding has become available for projects within the Macquarie River, Hawthornden Creek, Sawpit Creek and Jordan Creek. Ongoing works are required.

8.3.3 Threatened and Significant Species

Threatened and significant species likely to occur in the riverine environment of the Bathurst Regional LGA include the following:

Booroolong Frog (Litoria booroolongensis)

The Booroolong Frog is listed as Endangered in the BC Act and the EPBC Act. It was recorded in BioNet (2018) within the LGA in the Fish River five kilometres upstream of the Campbells River confluence. Another record was made on the Macquarie River at White Rock in 2012.

The Booroolong Frog lives along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses. Adults occur on or near cobble banks and other rock structures within stream margins. It shelters under rocks or amongst vegetation near the ground on the stream edge. Sometimes it basks in the sun on exposed rocks near flowing water during summer.

Under the Saving our Species program the Booroolong Frog has been designated as a site managed species and seven sites have

been designated for actions to ensure the conservation of this species to secure it from extinction in 100 years. One of the management sites is within the Bathurst Regional LGA in the Sewells Creek Catchment; however it is not on Council land. Another management site is on the Abercrombie River lies outside the LGA to the southeast.

Threats relevant for the VMP include:

- Modification of stream channels and loss of cobble banks;
- Loss of native streamside vegetation, damage to stream margins by stock;
- Predation of eggs and tadpoles by introduced fish;
- Weed invasion of streamside habitats, particularly by willows;
- Disease including chytrid fungus;
- Changes to water quality through sedimentation and use of herbicides or pesticides near streams;
- Stream drying caused by severe drought or water extraction/impoundment;
- Large amounts of sedimentation causing filling of breeding crevices; and
- High density of fossicking and in particular the illegal use of powered sluices and deliberate damming of stretches to facilitate use and damage and erosion to stream margins.

Activities to assist the species are:

- Retain riparian native vegetation;
- Maintain natural stream channel morphology;
- Reduce the stocking of introduced fish in streams where the species occurs;
- Minimise the use of herbicides and pesticides adjacent to streams;
- Protect streams and streamside vegetation from disturbance by stock; and
- Control weeds, particularly willows, and rehabilitate streamside habitats.

Macquarie Perch (Macquaria australasica)

The Macquarie Perch is listed as Endangered in the EPBC Act and Vulnerable under the threatened species provisions of the FM Act. Its survival is threatened by habitat degradation including siltation and river regulation. Its habitat requirements are cooler upper reaches of rivers and lakes.

The Macquarie Perch may persist in the deep rocky pools of the Macquarie and Turon Rivers and their tributaries, and other major streams in the region (Mjadwesch, 2011). DPI Fisheries (cited in Applied Ecology 2010) state that the Abercrombie River and several other tributaries of the Lachlan River contain important populations of the native Macquarie Perch, which are being reduced in number and distribution due to habitat destruction.

The Draft National Recovery Plan 2017 identifies the upper reaches of the Lachlan River catchment including the Abercrombie River as one of the few remaining self-sustaining viable populations in NSW. They require flowing runs or riffles and small complex rock piles. The removal of rock and woody snags, introduction of aquatic pests, siltation and degraded water quality have likely contributed to the loss of quality habitat. They require silt-free coarse substrates for spawning.

The Macquarie Perch NSW Priorities Action Statement has identified high and medium priorities that are relevant for the VMP including:

- Habitat rehabilitation to identify protect and restore habitats and address key threats such as habitat degradation and water quality decline; and
- Undertaking priority rehabilitation, restoration and enhancement work (e.g. rehabilitating riparian vegetation, cold water pollution reduction measures, reinstating large woody debris, removal of barriers to fish passage, removal of willows from riverbanks, sediment and erosion control measures) at key sites known to support Macquarie Perch populations.

Silver Perch (Bidyanus bidyanus)

Listed as Vulnerable under the FM Act, NSW Fisheries has recent records for the Silver Perch. Mjadwesch (2011) considers that the Silver Perch may now be restricted to the Abercrombie River and its tributaries; and Mactaggart (2012) cites Australian Museum records of Silver Perch at Winburndale Dam.

The Silver Perch Recovery Plan 2006 identifies threats that are relevant for the VMP as:

- Degradation of riparian vegetation by bank stability, shading (willows), soil conservation, water quality and availability of food or shelter for native plants and animals;
- Loss of aquatic vegetation;
- Removal of instream woody habitat (woody debris or snags);
- Sedimentation;
- Salinity;
- Algal blooms; and
- Agricultural chemicals.

The Silver Perch NSW Priorities Action Statement also has identified high and medium priorities that are relevant to the VMP including:

- Habitat rehabilitation;
- Working with local government to restore passage through roads and culverts; and
- To encourage community groups, relevant natural resource management agencies, local councils and landholders to protect and rehabilitate riparian vegetation and instream habitats along key river stretches where remnant Silver Perch populations are known to occur.

Murray Cod (Maccullochella peelii peelii)

Listed as Vulnerable under the EPBC Act, NSW Fisheries has recent records for the Murray Cod. Mjadwesch (2011) also considers the species persists in the deep rocky pools of the Macquarie and Turon Rivers and their tributaries, and other major streams in the region.

DPI Fisheries (cited also in Applied Ecology 2010) states that the Abercrombie River and several other tributaries of the Lachlan River contain important populations of the native Murray Cod, reduced in number and distribution due to habitat destruction.

A National Recovery Plan has been prepared for this species in 2010 that has relevance for the VMP.

8.3.4 Value of Waterways

Specific benefits related to native tree retention and regeneration on waterways are summarised below.

Environmental

- Provide vital habitat for terrestrial and aquatic plants and animals;
- Maintain water quality for domestic, industrial, agricultural, recreational and environmental purposes;
- Enhance bank stability;
- Slow overland movement of water and hence reduces the entry of sediments and nutrients into streams and rivers;
- Stream shading by upper-storey vegetation reduces the amount of light in the stream channel, which prevents excessive growth of aquatic plants, which can impede natural water flows;
- Reduce the risk of gully erosion; and
- Creeks and drainage lines provide vital habitat links in the landscape for fauna and flora.

Cultural

- Provides for an aesthetically pleasing landscape for local residents and visitors; and
- The natural resources and pleasing amenity provide for recreational opportunities.

Educational

- The environment of the rivers and watercourses are dynamic over time and are impacted upon by many extraneous factors such as stormwater inflow, sedimentation, pollution, habitat destruction etc. These factors, as well as the complexity of the ecosystems and hydrological functions make these environments significant educational resources.

8.3.5 Issues and Threats

- Loss of native trees, understorey, groundcover and aquatic species;
- Habitat loss for native terrestrial and aquatic fauna;

- Significant loss of biodiversity;
- Growing salinity problems;
- Increasing greenhouse gas emissions;
- Dominance of willows and adverse impacts on the ecology and river processes;
- High weed infestation;
- Streambank erosion;
- Catchment erosion causing sedimentation of waterways;
- Reduced water quality and eutrophication;
- Alteration of natural flow regimes;
- Lack of understanding by wider community of importance of natural river systems;
- Continued pressure from urban landscapes in terms of weed infestation from garden escapes, pollutants from stormwater, urban runoff, dumping of rubbish etc;
- Lack of funds to successfully restore waterways;
- Lack of planning for watercourse management;
- The removal of large woody debris; and
- Recreational access to riverbank of 4WD, camping and recreational uses.

a) Key Threatening Processes

The four key threatening processes listed with the FM Act that are of importance to vegetation management in Bathurst are:

- Removal of large woody debris;
- Degradation of native riparian vegetation along watercourses;
- Human-caused climate change; and
- Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.

The environmental effects of altered flow regimes are described in detail by NSW Scientific Committee (2002b), and include reduction in habitat for wetlands and floodplains, permanent inundation of ephemeral wetlands, degraded riparian zones, increased habitat for invasive fish species (including Carp, Gambusia and Redfin Perch), aquatic weeds (including Salvinia, Water Hyacinth, algae and cyanobacteria) and riparian weeds (such as Blackberry, Willows and Lippia). Further impacts include disruption of ecosystem functions leading to changes in invertebrate fauna and secondary impacts for vertebrate fauna; disrupted environmental cues for aquatic fauna; impaired life cycle processes for fish and other aquatic fauna, physical barriers to movement for fish and other species; reduction in availability of environmental water due to extraction; destruction of habitat through erosion and sediment deposition; and alterations to stream biota as a result of changes in water quality.

8.4 WATERWAYS MANAGEMENT

8.4.1 Guiding Principles

The functions of waterways are diverse, and consideration has to be given to their environmental, ecological, cultural and recreational values.

Further, many of the watercourse systems in the Bathurst City area pass through the urban environment, constraints and opportunities must be acknowledged to appropriately guide the rehabilitation and development of these systems. Similarly, in the rural areas and villages, Council owns discrete land parcels and opportunities for waterway restoration by Council are therefore limited.

The guiding principles that steer the direction of planned management are given below:

- Many waterways pass through land of differing tenure and this has wide ranging implications in terms of their value (i.e. stock watering, sediment control, urban stormwater management, aesthetic values), land use and management;
- Drainage reserves in the urban environment often have a limited function and require a considerable input of resources to maintain them. Increasing their function, and ultimately their value to the local community, will improve the benefit to cost ratio in the long-term;

- Watercourses are natural topographical features, which can potentially provide effective buffers in the urban and village environments. The buffers can achieve an appropriate edge between the rural and urban/ village landscape or between areas of differing land use;
- The very nature of watercourses, especially the riparian zone of creeks lend themselves to passive recreation and with appropriate planning of access ways and amenities they can be used as recreational links;
- The primary function of the watercourses and drainage lines is for the passage of water. The whole ecology and hydrology involved in this process is fundamental to any waterways management;
- Linking remnant vegetation around Mount Panorama and Boundary Road Reserve to the Macquarie River, and other vegetated linkages to key watercourses;
- Restoring degraded waterways in village and rural areas will improve water quality, riparian habitat value for terrestrial and aquatic fauna and enhance aesthetic values;
- Where there are threatened species known or predicted, utilise the objectives and relevant actions in Recovery Plans, Priorities Action Statements and Saving Our Species Projects, especially for Booroolong Frog, Macquarie Perch. Silver Perch and Murray Cod;
- Waterways are a resource to visually enhance the landscape and any development or rehabilitation should accommodate for this;
- Incorporate the objectives of the *Bathurst Integrated Water Cycle Management Strategy (2011)* where relevant; and
- Improve water quality for domestic, industrial, agricultural and recreational use both for the immediate area and to users downstream.

8.4.2 Strategies

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
OBJECTIVE 1: To restore the riparian vegetation along the Macquarie River (excluding the section between Hereford Street and Evans Bridges)	
W1. Undertake specific surveys to determine the priority ranking for Willow removal along the Macquarie River.	• Continue to undertake surveys to stage restoration on a long-term basis, which may require another 30 years; • Review priority ranking of sites with Council's willow control team; and • Update the *'Willow (Salix sp.) Replacement Guideline', 2013*.
W2. Seek funding opportunities for Willow removal and river restoration.	• Continue to source funds as a collaborative process between Council and community groups such as fishing groups.
W3. Control, remove and manage willows and environmental weeds, and undertake river restoration in accordance with recognised best management practices.	• Continue to implement best management practices through the *Willow (Salix sp.) Replacement Guideline, 2013*, through: – Minimisation of damage to existing vegetation (other than willows and other priority weeds) and streambanks; – Killing of willows by hand removal, cut and paint stump, foliar spraying or stem injection; – Revegetation of the site; – Protection of wildlife corridors; – Management of debris; – Use of herbicides; and – Removal of dead willows. • The dominant vegetation type is to be River Sheoak and where suitable Box-Gum Woodland canopy species. .

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
W4. Generate community support for riparian restoration through public awareness and education.	• Joint Council, community group and relevant government agency initiatives as opportunities arise.
W5. Develop a management plan for key reserves and Council land along the Macquarie River.	• Include relevant strategies from W1-W3. • Compile an inventory of native and exotic plants within the reserve. • Establish and maintain monitoring within the reserve such as photo monitoring points. • Update existing reserve management plans as required.
OBJECTIVE 2: To manage the riparian vegetation in the Macquarie River section between Hereford Street and Evans Bridges to provide for bank stability, erosion control, recreational usage and to enhance the aesthetics and natural ecosystems.	
W6. Protect and enhance native aquatic emergent, semi-emergent and floating plants.	• In key areas where aquatic plants are likely to occur, such as in pools (as compared to riffle areas) avoid slashing to encourage the establishment of these plants. It also allows for an improvement in habitat for waterfowl, frogs and other fauna.
W7. Manage the riparian vegetation to reduce the incidence of erosion, particularly on cut banks.	• Avoid slashing or spraying close to the bank edge on cut banks to encourage natural regeneration, to help stabilise the river banks and to discourage erosion caused by pedestrian access; and • Encourage the establishment of native vegetation especially River She-oaks along cut banks in a clearly defined riparian zone using Office of Water recommended riparian corridor widths as a guide.
W8. Improve the aesthetic appeal and recreational function of the river section.	• Plant native trees and shrubs in accordance with Office of Water guidelines and Council flood modelling strategy; and • Plant some trees within the park area to provide for shade and to add interest.

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
W9. Ensure appropriate species selection to avoid potential weed problems, to discourage undesirable bird species and to enhance the native ecosystem.	• Any exotic species should be non-invasive by either vegetative means or seed dispersal. Refer Appendix D Undesirable Plant Species; • Fringing vegetation to be solely vegetated with endemic species. River She-oaks to dominate the upper-storey vegetation with shrubs such as River Bottlebrush to be represented in the shrub layer and sedges, rushes and native grasses and forbs to comprise the ground layer; and • River She-oaks to be discontinuous along the river bank to maintain the recreational quality of the area.
OBJECTIVE 3: To rehabilitate, enhance and protect waterways which flow into the Macquarie within the urban environment	
W10. Establish native vegetation along all waterways wherever possible and where required integrate and implement environmental engineering solutions (e.g. Jordan, Hawthornden, Saltram, Queen Charlotte Vale (Vale), Creeks, and Raglan Creek off the floodplain).	• Implement recommended actions in the BUWMP (2011) (Jordan Creek - Tables 14 -17, Hawthornden Creek – Tables 19 – 22, Saltram Creek – Table 24, Raglan Creek – Tables 26 – 28; Vale Creek – Figures 15 - 18.) to remove riparian weeds and replant with native species, stabilise bed and banks, enhance amenity of open space, improve grazing regime, install retention/ sediment basins, instream bed structures, protect and revegetate the riparian zone; • Prioritise stabilisation of highly degraded and degraded sections of Jordan Creek, temporarily retain exotic vegetation to minimise bed and bank erosion, and consider localised flooding and Platypus sighting in the planning of works; • Prioritise stabilisation of highly degraded areas with active bank erosion within Hawthornden Creek; degraded areas subject to erosion from overgrazing; install cascading detention basins proposed for Mount Panorama stormwater upgrade; and retain stabilising vegetation; • Prioritise stabilisation of highly degraded area within Saltram Creek, implement open space for recreation and the environment in the Eglinton expansion with 20 m vegetated buffer and cycleway using water sensitive urban design to treat stormwater; • Prioritise degraded sections of Raglan Creek to stabilise eroding sections, install instream pools and riffles, remove willows and revegetate riparian habitat to improve environmental functioning, habitat connectivity and amenity; • Prioritise highly degraded and degraded sections of Vale Creek, remove/ manage grazing, revegetate riparian zone with native species to address erosion and improve environmental function and visual amenity. Carry out major bank stabilisation works and riparian zone rehabilitation at Upfold and Harold Street Open Space; • Continue restoration projects within Hawthornden Creek, Sawpit Creek and Jordan Creek and commence other

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
	creek projects; • Continue works within Raglan Creek drainage reserves to landscape with natives, enhance habitat linkage and public access; • Consider public safety (visual barriers using shrubs), potential branch falls close to residences and obstructing solar access etc; • Replace exotic vegetation, ensure good vegetation cover to reduce light levels to the creek and prevent excessive algal build up; • Revegetate only with native species and avoid the use of deciduous trees near the channel where leaf drop reduces water quality; • Drainage reserves and creeks within the Bathurst HCA to be representative of the 'waterways theme'; and • Upper-storey to be dominated by eucalypts such as Yellow Box, Apple Box, Ribbon Gum and Blakey's Red Gum and River Sheoak.
W11. Ongoing assessment, planning, implementation and reporting of work on priority urban watercourses with severe or very severe bank erosion using engineering and where possible revegetation to mitigate against on-going erosion.	• Assess the BUWMP (2010) in a 4-yearly monitoring cycle and include priority actions in Council's Operational and Delivery Plans; • Assess priority sites for remediation and restoration works on an 'as needs' basis; and • Prepare and implement a prioritised program of works for restoration of creek bank erosion in urban waterways.
OBJECTIVE 4: To rehabilitate Sawpit Creek (from Ophir Road to Mitchell Highway) for the benefits of recreation, protection and enhancement of remnant vegetation, stormwater control and the buffering of the urban environment	
W12. Plan the concept of developing Sawpit Creek to accommodate for recreational usage, conservation, stormwater	• Develop a landscape plan of the entire reserve and creekline from Ophir Road to the Mitchell Highway. • Implement the Bathurst Community Access and Cycling Plan 2011 integrating a cycleway along the open space area to link Suttor Street and Ophir Road; • Undertake recommended management actions from Tables 9 -12 of the Bathurst Urban Waterways Management

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
control and visual amenity.	Plan: – Protect and enhance of riparian vegetation and instream habitat; – Reduce sediment and nutrient loading from the urban and rural landscapes; – Adopt Water Sensitive Urban Design; – Improve fish passage; and – Engage the community; • Prioritise stabilising very severe channel erosion with channel widening, bed lowering where large volumes of sediment moving into the Macquarie River; and stabilising bed and streambank erosion (slumping) along sections of the waterway due to the highly dispersible subsoils; • Engineering structures to be designed to enhance the visual, recreational amenity and ecology of the area; • The vegetation theme is native, with upper-storey tree species to be endemic eucalypts including Yellow Box, Apple Box, Blakely's Red Gum and Ribbon Gum. • Avoid the introduction of non-native grasses; when using grasses for erosion and sediment control, select sterile annual grasses or perennial natives; • Continue weed removal with the area to be ultimately devoid of willows and exotic woody weeds; • Creek zone to be at least 20 m from the high bank, therefore 40 m wide plus width of creek channel; and • Retain standing dead timber from eucalypts, logs and trees with branch hollows, rocks etc. for fauna habitat, unless a public safety risk.
W13. Seek funding sources to allow for the full development and rehabilitation of Sawpit Creek.	• Council to continue to work with community groups to source funding opportunities such as grants beyond Section 94 Contribution Plan and capital works.
W14. Manage the creek zone to optimise its conservation value.	• Continue to remove and manage willows and exotic woody weeds from Sawpit Creek and undertake revegetation works; • Avoid slashing the drain where natural stream processes occur to enhance the habitat for semi-aquatic fauna and flora; and

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
	• Retain standing dead timber from eucalypts, logs and trees with branch hollows, rocks etc. for fauna habitat, unless considered a public safety risk.
OBJECTIVE 5: To enhance and protect the remnant vegetation along Sawpit Creek (from Mitchell Highway to upper catchment) for the benefits of conservation, recreation, and stormwater control	
W15. Future planning of the land adjacent to Sawpit Creek to make provision for its protection and enhancement.	• Recognise the RE1 zoning, DCP requirements and significance of Sawpit Creek for conservation, and ensure that any adjacent planning, subdivision or development proposal makes provision for its protection and enhancement through water sensitive urban design and landscaping with native vegetation; • Develop the creek for conservation, stormwater management and functioning as an open space area; • Implement the DCP requirements for the protection, restoration and enhancement of Sawpit Creek when considering planning and development proposals; • Key guidelines to include: – Retain existing native trees and shrubs; – Creek to contain only endemic upper-storey species and shrubs to be native; – Allow for natural regeneration in preference to replanting. Restrict stock access; – Remove and manage exotic woody weeds, and feral animals; – Creek zone to be at least 20 m from the high bank, therefore 40 m wide plus width of creek channel; and – Vegetation guidelines within DCPs to link to VMP.
W16. Encourage the planting of native vegetation along the upper catchment of Sawpit Creek to link to other remnant vegetation.	• Street trees in catchment area to be native if factors such as solar access, views, lot size etc. allow; • Gullies and drainage lines to be revegetated where possible and any willows and exotic woody weeds removed; and • Education and awareness through multi-media channels.
OBJECTIVE 6: To improve the function of urban drainage reserves to include visual amenity, improvement to water quality and recreational	

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
and ecological use, with due consideration of the basin's prime drainage function	
W17. Make provision for the enhancement of urban drainage reserves for recreation, visual amenity and conservation through relevant local planning instruments.	• Recognise the RE1 zoning, environmental protection – drainage areas and riparian land DCP requirements and maps for new developments and ensure that any adjacent planning, subdivision or development proposal makes provision for its protection and enhancement through water sensitive urban design, retention of native vegetation and landscaping with native vegetation; • Ensure DCP for new developments guidelines for protection of riparian vegetation and landscaping/ revegetation are adhered to that will enhance the function of the drainage reserves; and • Schedule works for stormwater drainage to link revegetation as a function of stormwater management.
W18. Design and landscape drainage reserves to improve their visual and recreational and ecological amenity value.	Landscape with due consideration of the reserve or basin's prime drainage function in accordance with the guidelines for open spaces in the *Bathurst Regional Council Guidelines for Engineering Works (April 2011).* The guidelines are: • Where possible, tree and shrub plantings within floodway reserves should be located clear of the designed flowpath. If the use of shrubby plant material cannot be avoided, the floodway width shall be increased to accommodate this factor; • Where practical, open space, parkland reserves and retarding basins should be strategically designed on a whole catchment basis to improve downstream flow conditions and reduce flow velocities; • No vegetation, other than grass, should be planted in channels and overflow paths beneath the surface level of the 5% Annual Exceedance Probability (AEP) flood event; • Trees with clean boles, strong crown structure, and with no propensity to root suckering may be planted at minimum three metre spacings between the 5% and 1% AEP flood levels; • No shrub or flow interference landscaping should be designed below the 1% AEP flood level; • Open space areas should be grassed and free of boulders, dirt and debris; • All open space areas and drainage reserves should be contoured to facilitate easy mowing; • Species recommended for planting between the 5% and 1% AEP – include Eucalypts, and She-oaks that have been canopy lifted. Size of the drainage reserve and locality to dwellings may dictate species selection. Narrow drainage reserves may warrant small growing eucalypt species. No mallee or multi-stemmed trees, trees unable to be canopy lifted or shrubs recommended. Where batter slopes are 1:10 or gentler, and are outside the 1% AEP, plantings in the drainage reserve to be predominately native. Some exotics can be planted near residential areas avoiding those listed as undesirable near remnant vegetation or riparian zones (Refer Appendix D); and

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
	• Plantings to be grouped into clumps rather than planted linearly or randomly scattered to improve the overall visual impact and can cut down maintenance requirements if a knockdown herbicide is used around the clumps to reduce slashing. Some open grassed areas also increase the options for recreational usage. Integrate the drainage reserve as an open space area for the community to use for recreation. To compensate for increases in maintenance, decommission other open space areas according to the Open Space Strategy or 'vacant' block areas currently under-utilised. Plan the area of the reserve to accommodate for its multifunction (i.e. narrow reserves limit their use). Incorporate wetlands where possible as part of sediment ponds, detention basins etc.
W19. Develop a concept plan and continue to rehabilitate Raglan Creek for stormwater control, open space and nature conservation.	• Provision needs to be made for open space and nature conservation in planning, engineering and landscaping works; • Continue the 'Reviving Raglan Creek Project' including: – Stock-proof fencing where required; – Control of woody weeds including tree weeds; – Revegetation along the riparian zone; – Stabilising creek banks in areas of active bank and bed erosion through appropriate techniques such as erosion control fabric and loose rock, and subsequent revegetation with native shrub and semi-aquatic species; and – Installation of interpretive signs to inform the community of water quality/creek biodiversity issues relating to waterway management.
OBJECTIVE 7: To develop, rehabilitate and manage waterways according to their governed stream processes	
W20. Evaluate streams according to their hydrological, morphological, physical and ecological characteristics.	Some waterways are natural; others are formed as a result of severe gully erosion. These types of drainage lines need to be managed differently and in respect to the land use. The demarcation between engineered solutions to drainage management and allowing for natural stream process to occur needs to be assessed by technical experts, specifically Council and OEH. • The evaluation needs to occur on undeveloped drainage lines before revegetation or engineering works are undertaken; and

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
	• Natural stream processes and the associated ecosystems need to be balanced with engineering requirements.
W21. Develop, rehabilitate and manage urban drainage lines according to their governed stream process.	Engineered drainage lines. • Council guidelines (2011) apply. Where natural processes occur general recommendations include: • Do not plant undesirable species in stream channel or along banks (Refer Appendix D); • Plant native species. Endemic trees where possible and native shrubs and groundcovers; • Keep drainage lines free of environmental weeds. Controlled willows to be replaced with native species if native canopy cover is limited; • Maintain a canopy of trees over drainage lines to reduce the incidence of algae and semi-aquatic plants such as *Typha* and *Phragmites,* which can cause channel blockages. This can also help to exclude other undesirable terrestrial weeds and help to improve water quality and fauna habitat; • Floodplain areas to be free of trees and vegetated with native aquatic, emergent and semi-emergent plant species where possible; • Keep the natural substrates including sands, gravel, rocks fallen logs etc. If logs or branches obstructing flows, realign to allow the free passage of water. Mixed materials are habitat for aquatic fauna; and • Where possible creek buffers to be 20 m from high bank, therefore >40 m wide, plus channel width dedicated for open space. To define the width of the vegetated riparian zone guidance is to be drawn from the Office of Water Guidelines according to the Strahler Stream Order.
OBJECTIVE 8: To restore, rehabilitate and manage waterways in villages and rural areas according to their governed stream processes	
W22. Restore, rehabilitate and manage village and rural waterways and drainage lines.	• Undertake surveys to stage restoration on a long-term basis to prioritise works; • Prepare and implement a prioritised program of works for restoration of creek bank erosion in village and rural waterways; • Fringing vegetation to be solely vegetated with endemic species. River She-oaks to dominate the upper-storey vegetation with shrubs such as River Bottlebrush to be represented in the shrub layer and sedges, rushes and native grasses and forbs to comprise the ground layer. Do not plant undesirable species in stream channel or along banks (Refer Appendix D);

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
	• Keep waterways and drainage lines free of environmental weeds such as Willows, Blackberry, Poplars and Elms. Controlled tree weeds to be replaced with native species if native canopy cover is limited; • Maintain a canopy of trees over drainage lines to reduce the incidence of algae; • Protect and enhance riparian vegetation and instream habitat, reduce sediment and nutrient loading from the village and rural landscapes with the use of basins where possible, improve fish passage and engage the community through planting days and signage; • Use Water Sensitive Urban Design practices; • Floodplain areas to be relatively free of trees and vegetated with native aquatic, emergent and semi-emergent plant species where possible; • Keep the natural substrate including sands, gravel, rocks fallen logs etc. If logs or branches obstructing flows, realign to allow the free passage of water. Mixed materials are habitat for aquatic fauna; • Where aquatic plants occur, such as in pools (as compared to riffle areas) avoid slashing to encourage their establishment; • Avoid the use of herbicide where possible in the riparian zone. If herbicides are used ensure that they are registered for aquatic use; and • Where possible creek buffers and revegetation to be 20 m from high bank, therefore >40 m wide, plus channel width dedicated for open space. Guidance on vegetated riparian zone width to be drawn from Office of Water Guidelines and the Strahler Stream Order.
OBJECTIVE 9: To restore, rehabilitate and manage waterways in high priority recreational sites along the Turon River	
W23. Restore riparian vegetation, stabilise creek banks and address degrading processes at high usage camping areas on the Turon River at Coles Bridge and Oaky Creek	• Prioritise stabilisation of erosion, steep slopes and creek banks; • Restrict access to the river by 4WDs where possible; • Install signage prohibiting firewood collection; • Undertake weed control; • Undertake riparian revegetation works in clearly defined riparian zones in coordination with campsite users and managers; and • Coordinate works at Oaky Creek with hillslope stabilisation and revegetation.

Table 7 Waterways Strategies	
Strategies	**Recommendations/Guidelines**
OBJECTIVE 9: To restore, rehabilitate and manage waterways and improve recreational access along the Queen Charlotte Vale Creek, Perthville	
W24. Restore riparian vegetation, create riparian habitat linkage along Queen Charlotte (Vale) Creek Perthville	• Prepare a riparian corridor masterplan; and • Undertake creek bank stabilisation, removal of weeds and revegetation of riparian zone.
OBJECTIVE 10: To restore, rehabilitate and manage waterways and improve water quality and amenity of Peppers Creek, Rockley.	
W25 Restore riparian vegetation along Peppers Creek Rockley, to improve water quality and amenity.	• Investigate potential leases and management of Lot 701 and other Crown Land adjacent to Peppers Creek. • Implement a program of riparian restoration, tree replacement, weed control, revegetation and bush regeneration of the more resilient vegetation.

8.4.3 Actions

Table 8 Waterways Actions		
Action	**Strategy Identifier**	**Importance Ranking (1-highest, 4-lowest)**
Restore the riparian vegetation along the Macquarie River.	W1,W2,W3	1
Establish native vegetation along all waterways and integrate engineering solutions to mitigate against erosion in key identified areas.	W10, 11	1
Rehabilitate Sawpit Creek from Ophir Road to Mitchell Highway.	W12, W13, W14	1
Protect and enhance Sawpit Creek from Mitchell Highway to upper catchment.	W15, W16	2
Utilise planning instruments for the enhancement of drainage reserves.	W17	1
Design and landscape drainage reserves to be multi-functional.	W18	3
Make provision for Raglan Creek within Bathurst Regional DCP to have enhanced conservation value.	W19	1
Evaluate streams according to their stream processes.	W20, W21	4
Restore, rehabilitate and manage village and rural waterways and drainage lines	W22	2
Restore riparian zones at high usage camping areas on the Turon River at Coles Bridge and Oaky Creek	W23	2
Restore corridor along Queen Charlotte (Vale) Creek Perthville	W24	3
Restore riparian vegetation along Peppers Creek, Rockley	W25	2

9 STREETSCAPES

9.1 VISION

Through design considerations and appropriate species selection, the streetscapes are to reflect and enhance the heritage and rural identity of the Bathurst Regional LGA. The streetscapes are to create uniqueness to the City, villages and rural areas. Street tree cover is to be increased to help reduce urban temperatures and provide a more comfortable living environment for residents and visitors.

9.2 INTRODUCTION

The existing and future streetscapes are fundamental in dictating the region's living environment, and integrating the built, rural and natural environment.

This section includes the Bathurst City, village streets and roads in the Bathurst Regional LGA as well as cycle ways and carparks. Management of the streets beyond the Bathurst City and village boundaries are governed by the Roadside Vegetation Management Plan 2018.

MAP REFERENCES

Map A – Vegetation Themes

Map B – Significant Vegetation and Natural Landscapes

Map E – Site Specific Projects

9.3 BACKGROUND

9.3.1 Setting the Scene

a) Bathurst

The first formal street tree planting in Bathurst was thought to have commenced in 1871 and was undertaken by Council. Most of the streets close to the centre of town and towards the railway line would have had a formal row of trees of the same species, usually on both sides (Street Tree Assessment Report of the HCAs of Bathurst, Rockley and Hill End, 2007). Subsequent losses of trees resulted in gaps, unbalanced or incomplete avenues.

The earliest surviving plantings in Bathurst and surrounds are aged over 100 years and feature deciduous trees that turn yellow in autumn, most notably the English Elm (*Ulmus procera*) and Claret Ash (*Fraxinus angustifolia*) 'Raywood'. These large-scale trees suited wide verges and Victorian buildings.

In 2007, very few of the early trees remained in a healthy condition, with poor arboricultural practice of severe lopping undertaken approximately 40-50 years ago, starting their decline and demise through pests and disease. Bathurst City's urban trees are also subject to multiple urban impacts including ongoing maintenance and upgrading of overhead and underground services, as well as increasing soil compaction of the ageing tree root systems from pedestrian and vehicles.

Since the 2007 Street Tree Assessment was completed, many senescent trees have been removed and replaced.

The newer developments have reduced street widths and street layouts that are curvilinear, including cul-de-sacs. Within these streets, the nature strips essentially become incorporated into the residential garden. These limitations have resulted in the road verges being used for vehicle parking and accessed by pedestrians and cyclists. While the potential to grow large trees has diminished, there is scope to landscape the new subdivision areas as tree lined streets. The need for constant pruning is also removed with these areas as they are serviced with underground electricity and telecommunications lines.

Within the new developments of Eglinton, Kelso, Laffing Waters, Windradyne, Llanarth and Abercrombie, there is a need to provide street tree planting where absent. These street trees would provide shade, cooling and visual appeal, screen fences, buffer and create a transition between rural and urban landscapes. Plantings should avoid underground services and other utilities and infrastructure.

b) Villages

Streetscapes in villages feature a mix of exotic and remnant vegetation. This VMP addresses streetscape vegetation within the village areas, whereas a separate Roadside Vegetation Management Plan (2018) addresses vegetation in the rural road corridors beyond.

The village of Rockley was laid out in a modified grid system from 1851-1853. The main street, Hill Street, appears to have been formally planted on both sides with English Elms thought to be over 100 years of age. Many of these Elms are in poor condition having multiple defects due to poor arboricultural practices, including severe lopping undertaken approximately 40-50 years ago. This has led to reduced vigour and the opportunity for insect attack from the Chysolmelid Elm-leaf Beetle (*Xanthogaleruca luteola*).

Hill End village streets have no formal grid pattern and have a mixed species composition of street trees, the majority of which are at least 50-100 years in age or greater. The three most commonly used species are English Elm, Monterey Pine (*Pinus radiata*) and Black Poplar (*Populus nigra* 'Italica') (Regional of Bathurst Heritage Study Volume 1 and Evans Shire Council Heritage Study Volume 1). *Pinus radiata* were established approximately 100 years ago in Beyers Avenue.

Perthville is noted for the avenue of Elms on Vale Road which is a significant entry feature to the village, and is addressed in Chapter 11 - Gateways. In the HCA near the heritage buildings there are some planted deciduous street trees and in the other parts of the village there are native plantings, whilst poplars are present on the outer parts of the village.

Wattle Flat Village has a narrow road reserve with some remnant vegetation on the outskirts, however there are few street trees in the HCA, being limited by overhead powerlines.

Trunkey Creek village has remnant native vegetation on the outskirts of the village which should be retained. There are some undesirable species within the narrow road reserve and a few street trees on the eastern (low) side of the road opposite the hotel.

Georges Plains has few street trees within the narrow road reserve.

The narrow streets of Sofala provide little opportunity for street trees. The Joyce Pearce Memorial Park functions as a focal point at the entry to the village and is addressed in Chapter 11.

Peel Village has remnant native vegetation on the roadsides within the village, and some Poplars planted as street trees within the narrow road reserve in Dempsey Street.

Yetholme has significant areas of remnant native vegetation along Yetholme Drive, areas of Monterey Pine, and occasional street trees in the more settled parts.

Napoleon Reef has significant remnant native vegetation along its streetscapes.

9.3.2 Values of Street Trees

Trees within the urban and rural village landscapes have many aesthetic, functional, economic and environmental values and benefits to the community. Many of these benefits are particularly important to help the urban environment adapt to climate change and minimise the associated impacts on the community. Trees are valuable because they:

- Can function to improve microclimate, provide shade, intercept and reflect incoming radiation, absorb heat, modify wind and contribute to air quality;
- Produce oxygen and absorb carbon dioxide and potentially harmful gasses, such as sulphur dioxide and carbon monoxide from the air. One large tree can supply a day's supply of oxygen for four people;
- Reduce the need for heating and cooling for nearby buildings, ameliorate climate and mitigate the urban heat island effect;
- Absorb and store rainwater which reduces runoff, preserves soil against erosion and sediment deposit after storms. This helps the ground water supply recharge, prevents the transport of chemicals into streams and prevents flooding;
- Aesthetically, provide scale balance for buildings, soften hard landscapes, direct a focus for attention, frame views, gives

variety through colour and form and adds a distinctive character to an area;

- Provide screening, privacy and can reduce headlight glare;
- Complement the heritage values of HCAs and heritage parks. The heritage value of the trees and their autumn colouring is a notable tourist attraction;
- Add interest to a streetscape, and with appropriate landscaping can enhance or maintain the cultural heritage significance;
- Create an ecosystem to provide habitat and food for birds and other animals;
- Can improve a barren urban or village environment;
- Link urban or village elements such as parks, roads, gardens and buildings;
- Provide links between the rural and urban/village environment, ensuring the interface between each landscape is blended and not harsh edged;
- Well laid out street trees detract and obstruct the visually unattractive power lines by providing unity in the landscape;
- A well laid out streetscape with good tree plantings improves the market value of real estate;
- Provide seasonal colour variation and add visual appeal to the streetscape; and
- Help to reduce the amount of surface water leaching into the groundwater system and hence plays an important role in reducing the current (and likely worsening future) impacts and costs of urban and rural salinity.

a) Community Values

Community values on the Bathurst City streetscape have been expressed that reflect the cultural identity of the City and the appreciation of its unique setting nestled within a rural landscape. The values expressed are given below:

- The distinctive urban landscape characterised by avenues of street tree plantings that afford long extended views down shaded urban streets towards the cleared, rolling rural lands and the distant timbered ranges;
- The heritage parks and streetscapes;
- The cultural links to the City's history reflected in the traditional parks and street tree plantings in the older parts of City;
- Autumn foliage in Machattie Park and Kings Parade an asset to Bathurst; and
- Lack of trees has also been addressed by the community as a negative quality.

Aesthetically appealing street trees are estimated to have a positive impact on property values with, for example, estimated house prices in Brisbane being approximately $16,000 higher than house prices in streets without trees (Plant et al., University of Queensland, 2016, 2017).

9.3.3 Bathurst Regional LGA - Street Tree Values

Bentinck Street Elm Trees

The mature Bentinck Street Elm trees located between Durham and Howick Streets are State Heritage listed. They were planted around 1900 and make a significant contribution to the historic townscape of Bathurst (NSW Heritage Office updated 2008, viewed 2018).

Bathurst Central Conservation Area

The Bathurst Central Conservation Area (BCCA) was listed in the now archived Register of the National Estate and covered about 40 hectares. It comprised generally the area bounded by the rear of the properties on the northern side of Howick Street, by Bentinck Street and Keppel Street and by the rear of the properties on the western side of Rankin Street. The Statement of Significance recognised '*with its historic character, the cohesiveness created by the red brick used in many of the buildings… and the fine parks and streets, the conservation area is a part of Bathurst that has strong streetscape and other aesthetic qualities*' (Register of the National Estate (Non-statutory archive), 2018.).

Rockley HCA Street Trees

The community value of the Rockley trees is intrinsically linked to its heritage village. The Statement of Significance in the heritage listing documents the village as *'picturesquely sited, the village slopes quite steeply down Hill Street towards the park. Along many streets, and in*

particular in the park and in Hill Street are large mature [Elms].'

The aging Elm trees planted along Hill and Church Streets are an important feature of the village. As senescent and damaged trees are removed they should be replaced with appropriate deciduous species that reflects the heritage village and are resilient to disease, climate and insect attack.

Hill End HCA Street Trees

Community values of Hill End village street trees correspond with the national, state and local cultural heritage values of Hill End, that '*from the hectic goldrush era and subsequent years of decline, to the period of NPWS intervention, the village, buildings, vacant sites and gardens continue to reflect the social and economic forces which continue its survival*' (OEH, Statement of Heritage Significance).

They feature a commemorative avenue of aging Elms, Monterey Pine and Black Poplar of mixed ages interspersed with a variety of other tree species (mainly deciduous) that reflect the lack of formal grid pattern to the streets. Replacement trees should be deciduous respecting these values.

Village Street Trees

In the other HCAs the community values of the streetscapes also reflect the heritage nature of the villages to a greater or lesser extent. Perthville has the greatest extent of plantings including Crabapples which have vibrant autumn colours. Other HCA villages have few plantings due to limitations of infrastructure and width of road reserves; however future plantings should utilise deciduous species of small trees and tall shrubs to minimise conflicts with infrastructure.

Napoleon Reef and parts of Yetholme have significant stands of remnant native vegetation within the streetscapes that form an important part of the identity of the localities.

9.3.4 Threats

Street trees can suffer a wide range of diseases such as those induced by mechanical injury sustained by poor pruning practices, root disturbance or trunk damage. Other factors including climatic extremes, insect infestations, unfavourable growing conditions and poor species selection also contribute to street tree decline.

Climatic Conditions

The effects of drought or extended dry periods are known to cause water stress in plants, which can also cause secondary diseases compounding the problem. While most of the established trees recover, newly established trees may die or be severely stunted and diseased.

Parts of the Bathurst Regional LGA are within a rain shadow and often experiences dry periods, which becomes a constraint to species selection and management. Fully recognising this aspect will reduce the threats of drought on vegetation within the Bathurst Regional LGA.

Climate Change Adaptation

Street trees are already under threat from altered microclimatic conditions, excess heat, pollution, limited water availability, salt contamination, and poor soil quality. In order to grow healthily, trees need to be sufficiently adapted to these stresses. In addition, climate change impacts of increased heat and drought stresses on street trees need to be considered, as some species are possibly not adapted.

A German study of deciduous trees (Brune, 2016) found that drought tolerant species tend to be more heat tolerant as well, while drought sensitive species are also sensitive to heat. It cautioned that tolerance and sensitivity strongly depend on local conditions and can vary between different provenances or even between individuals. Projected bandwidths of climatic changes combined with vague information on stress tolerances complicate generally valid ratings of future tree species suitability.

While definite recommendations for or against the selected species for the specific case study regions was not possible, it recommended that planting should focus on 'very tolerant' or at least 'moderately tolerant' species and avoid 'moderately sensitive' and 'very sensitive' species. Because many local factors influence tree vitality, suitability assessments should be made on a case-by-case basis and implementation should ideally be supported by

a long-term monitoring process. The general classification below provides a basis for a further evaluation.

Ten species were classified according to their drought tolerance or sensitivity which found:

- Very tolerant - Silver Birch (*Betula pendula*);
- Moderately tolerant - Norway Maple (*Acer platanoides*, European Ash (*Fraxinus excelsior*), English Oak (*Quercus robur*);
- Moderately sensitive - Horse Chestnut (*Aesculus hippocastanum*), Sycamore Maple (*Ac. pseudoplatanus*), European Beech (*Fagus sylvatica*); and
- Very sensitive - Black Alder (*Alnus glutinosa),* Black Poplar (*Populus nigra*), White Willow (*Salix alba*).

For heat tolerance, the same classification found the following results:

- Very tolerant - Silver Birch, European Ash;
- Moderately tolerant - Horse Chestnut, Norway Maple and English Oak; and
- Moderately sensitive - Sycamore Maple and European Beech.

Due to insufficient information, no assessment of heat tolerance was possible for Black Alder, Black Poplar and White Willow.

The use of native trees as street trees is also important to connect areas of native vegetation and create stepping stones at landscape scales. Native flora provides habitat for mobile fauna species and populations in the region, and can be a link allowing for shifts in species distributions, which should assist native species adjust to changing climates. Generally, native tree species supports native bird assemblages while exotic species support exotic birds.

Street tree plantings of native species should consider the use of species that are tolerant of drier and hotter temperatures, including species with current natural distributions and plant provenance from the western part of the region. This may include consideration of street trees such as Kurrajong (*Brachychiton populneus*) and Black Cypress Pine (*Callitris endlicheri*) that are tolerant of dry conditions and higher temperatures.

Soils

The dominant soils in the Bathurst Regional LGA derived from the Bathurst Granites are generally of low to moderate fertility and have a moderate to high erosion hazard. The poor physical and chemical properties of these soils strongly influence the growing potential of the vegetation and often become a key limiting factor to the overall health of the vegetation.

In contrast, the alluvial soils of the Macquarie River floodplain and soils underlain with basalt, as occurs at Mount Panorama and Mount Stewart, have characteristics more suited to vegetation establishment and growth.

The soils of the villages of Wattle Flat, Sofala, Napoleon Reef and Yetholme are derived from Mount Horrible Plateau conglomerates, sandstones, and mudstones, known for nutrient deficiency and high erodibility.

Yetholme soils are derived from granite with low fertility and moderate rilling and gully erosion.

Soils of Rockley are derived from the Rockley Plains with slate, phyllites, felspathic sandstones and interbedded volcanics, with low to moderate fertility and minor to moderate gully erosion.

Trunkey Creek soils are low fertility with moderate to minor erosion hazards.

Soils of Hill End are derived from the Ophir – Hargraves plateau of dacite, crystal tuff, quartzite and slates. Fertility is low with Aluminium toxicity, with moderate to severe erosion gullies and tunnelling.

Poor Pruning Techniques

Typical problems relating to poor pruning techniques have created a negative legacy for many of the mature heritage trees in Bathurst City, Hill End and Rockley and include:

- Production of large wounds to the cambium layer, which can become infected causing decay and eventually structural decline;
- Production of weakly attached, vigorous vertical suckers;
- Potential for borer damage;
- Decay produces dieback and ultimately branch drop;

- Sun scalding of bark causing ultimate dieback;
- Tree imbalance and bias;
- Disease transference; and
- Inducing disease to otherwise healthy trees.

The disease incidence of trees within the above HCAs is evidenced by the above mentioned problems as well as structural instability ('v'-notch branch unions), sun scald, and basal suckers on many stressed trees. They may also be more susceptible to Elm Leaf Beetle attack, Ash dieback disease (an international problem affecting trees under stress, eventually causing its death), and borer attack.

9.3.5 Water Sensitive Urban Design

Raingardens and Biofiltration Systems

Water sensitive urban design (WSUD) principles should be considered in street master planning in new suburbs and retrofitted into urban areas where possible. Raingardens can also be integrated into street tree planting. Where new trees are situated within concrete or sealed verges, the use of permeable surfaces around the trees will allow water to infiltrate into the root zone. Research shows that vegetation, especially trees, can effectively mitigate urban heat to achieve human health and comfort benefits, by reducing temperatures during heat waves.

Raingardens and biofiltration systems in urban and village areas are an important consideration for the cooling benefits of green infrastructure. They can be designed to cool streetscapes by enhancing evapotranspiration, supporting trees, improving water quality and providing irrigation (CRC for Water Sensitive Cities, 2017).

9.3.6 Design Considerations

There are a number of design principles which when applied can achieve interesting, unified, balanced and aesthetically pleasing streetscapes. These design principles form the basis of many recommendations for streetscape planning and management and are briefly described below.

The concepts of design can be equally applied to the parks and gardens and gateways and as such are considered accordingly in those areas of the VMP.

Visual unity

A unified landscape is harmonious, provides a strong visual impact and creates a sense of place and character. Unifying an area through landscaping is visually enhancing, particularly where the built environment is distracted by overhead power lines, discordant buildings, wide variation in architectural style or building materials.

Unity can be achieved using a number of design strategies. These are listed below:

- Group elements together in close proximity;
- Particularly useful in parks and gardens where for example native trees, shrubs and groundcovers can be closely grouped together. Similarly, with street trees, keep the spacings close together (relative to scale and other constraints);
- Use repetition to achieve unity by keeping foliage colour the same (e.g. yellow autumn foliage), tree height, tree form (columnar habit) or texture (large leaves) uniform;
- Planting of double rows of trees on wider street verges to provide a dense planting. A selection of two different species with similar forms can be used for visual impact; and
- The continuation of a theme can also be used to create unity, such as avenue planting of the same tree species. To prevent visual boredom, it is necessary to have a theme with some variation. A solution to this problem is restricting avenues of same species trees to within given boundaries. The boundaries are often dictated by factors such as topography, road junctions and features of the built environment. Variation within a theme can also be achieved through the introduction of other elements such as contrast between foliage colour, leaf/bark texture, scale of planting, tree form or native/exotic mix. Variance is designed to give interest through diversity as opposed to *ad hoc* plantings.

Focal Points

The layout of the street grid in the CBD, the wide streets and the slope of the land allow for rural vistas to be viewed from many aspects of Bathurst. These vistas become the focal points of the streetscape or from the viewing location and need to be preserved, enhanced or maintained. Another significant feature characterising Bathurst are the CBD street lamps. They give visual contrast to the buildings and therefore provide focal points to the streetscapes of George, William and Keppel Streets. Street trees can be other features or accents, though they should command lesser attention.

Many other parks, public places and streets within Bathurst are without a focal point and appear uninteresting due to the lack of a feature that can draw attention. In these instances, consideration needs to be given to the value of a focal point such as a water feature, feature trees, or enhancing the views to an existing feature such as the Carillon and Mount Panorama.

Rural HCA villages often have a focal point around heritage buildings where strategic street tree plantings can enhance the aesthetic value of the streetscape. This will require a case by case analysis as many of the road reserves and overhead powerlines do not allow for planting of large trees. Nonetheless smaller specimens may be suitable for planting to complement the heritage buildings, streetscape and the village settlements.

Balance

Tree lined streets need to be balanced. Tall trees on one side would appear out of balance if the other side had only a line of small trees. This is most evident on flat terrain and sloping land that requires the lower side to be planted with taller growing species to be balanced.

Balance can be used effectively to achieve a sense of formality or informality. Symmetrically designed layouts, where like shapes are repeated on either side of an axis, such as in Kings Parade that function as formal gardens.

Conversely, asymmetrical layouts create more informal designs and are balanced using dissimilar objects that have equal visual weight or equal eye attraction. For example, trees of lime-green coloured foliage should be subdominant to trees with mid-green or dull foliage.

Likewise, locations where terrain is sloping or where road reserves are narrow may lend itself to feature planting on one side of the road.

Scale

Scale gives a sense of proportion. Wide streets and expanses of open spaces lend themselves to relatively large scale planting, whereas smaller scale surrounds require more appropriately smaller scale plantings.

For example, shrubs or small trees planted in wide streets or open parklands become ‘lost’ and insignificant. Scale imbalance is also created when overly large trees are planted along narrow streets with small dwellings.

For optimum visual impact the plantings should complement the scale of the landscape features.

Rhythm

Rhythm is based on repetition of elements that are the same or only slightly modified. The impact can be quite dramatic when used with contrasting elements. For example, avenues of trees with very light bark and tall, straight boles (e.g. Ribbon Gum), or dark, rough-barked trees (e.g. Mugga Ironbark) can be used to contrast with a more neutral background.

Colour

Colour plays an important role in design and can be a tool used to define character and to provide visual interest. Bathurst’s heritage and rural identity needs to be defined with complimentary foliage and flower colours, avoiding discordant colours which are alien to the Region. Colours to select from include the blues, greens, creams, golds and reds reflecting the surrounding hillsides and areas of remnant vegetation and muted colours of the heritage buildings.

9.4 MANAGEMENT

9.4.1 Guiding Principles

To achieve a unified, functional and visually pleasing streetscapes, many considerations need to be addressed that involve strong design principles, species selection and solutions that overcome constraints. These factors form the guiding principles which govern the development of strategies and recommendations. The guiding principles are outlined below.

The streetscape vegetation is to preserve, enhance and reflect:

- The heritage significance of the Conservation Areas:
  - The general rural identity of Bathurst City and historic villages;
  - The interface between the rural and urban landscapes;
  - Views to the outlying rural landscapes;
  - A particular character or theme of an area;
- The prominent ridgelines and crests around Bathurst;
- The views and vistas from rural villages;
- The objectives and strategies to reflect the intrinsic value of street trees and the values expressed by the wider community;
- Streetscape vegetation must consider solar passive values of winter sun and summer shade, improving the microclimate in residential and recreational areas as well as in the commercial/retail sectors;
- Consideration is given to utility and transport infrastructures, ensuring low maintenance outcomes and uninterrupted functionality of the services;
- The streetscape vegetation is to be part of an integrated plan to link areas of remnant vegetation that lie within the urban, village and rural landscape;
- Species selected is to accommodate for the constraints of soils, current and changing climate, infrastructure, view requirements and landuse, as well as having a low maintenance requirement;
- Species selected are to avoid current and emerging priority weeds, and to provide habitat for native fauna;
- Trees being removed due to senescence should be retained as habitat structures if significant hollows are present. Nest boxes or hollow augmentation used to replace lost hollows;
- The streetscape is to be aesthetically pleasing, being planned on the foundation of good design principles;
- Recognise the issues to street tree landscaping in regard to street and footpath width, service utilities, pedestrian and cyclist usage, traffic factors, street layout and sight distance to intersections, street signs, traffic lights etc;
- Recognise the role of street trees in providing a thermal buffer and urban cooling through the use of raingardens and biofiltration systems where possible;
- Recognise the potential for streetscapes with remnant vegetation to provide habitat for threatened flora and fauna, especially in the Yetholme area, for species such as the Bathurst Copper Butterfly and *Geranium graniticola*.; and
- Address current and future salinity and rising groundwater issues through targeted revegetation and water use efficiency strategies.

9.4.2 Strategies

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
OBJECTIVE 1: To develop the streetscape to enhance and protect Bathurst Regional LGA's rural and cultural identity	
S1. Use the theme framework to guide the planting focus in new and existing areas so desired visual outcomes are maintained or achieved.	• Refer Section 5 & Map A.
S2. Maintain the rural landscape vistas visible from many parts of the City/ villages and surrounds through current strategic planning and appropriate streetscaping.	• Narrow streets with a rural vista as a focal point should be planted with small street trees or of a type with an upright habit to prevent view obstruction. Plant trees only on the footpaths or kerbside where rural views are to be maintained (i.e. avoid planting along the median); and • Where rural vistas are significant, trees need to be widely spaced, grouped together or of upright habit so views are not obstructed (for example, Eglinton Road along the access path has views across the floodplain, and the major gateways into the City offer views of the rural and floodplain landscapes).
S3. Plan urban expansions and associated streetscapes in a manner which achieves a desirable interface between the urban, village and rural environment.	• Where rural residential areas buffer the more densely developed urban and village areas with the rural landscape, the streetscape and associated theme should be a mix of natives and exotics to create a gradual transition from one environment to another; • The interface between the natural or rural landscape and the urban/ village environment to be 'softened' by a number of options such as (a) rural subdivision using a theme of exotics and native vegetation; (b) a delineation of the environments by a topographical feature such as a ridge line or well vegetated watercourse; (c) screening boundary fencing with native shrubs and small trees; • Enhance, protect and link areas of remnant vegetation on the western fringe of the City; and

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	• Enhance, protect and link areas of remnant vegetation within rural and village areas.
S4. Maintain and enhance the heritage significance of Bathurst and other HCAs.	General • In the HCAs street trees to be deciduous. The selection of species to be dependent on specific location; • Where there are grid patterns of roads, it lends itself to avenues of exotic themed species trees; and • Street trees and plantings in parks and gardens to be in character with the built environment and cultural heritage (i.e. avoid the use of inappropriate species). Specific Guidelines for Bathurst, Rockley and Hill End HCAs • Update the Heritage Tree Assessment Report. In the interim, continue to implement the recommendations of the existing report: • Mitigate hazard trees including removal or extensive remedial pruning of hazardous trees in public areas and replace; • Regularly prune public trees on a five yearly interval, based on assessed hazard ratings; • Implement an annual Tree Planting Program to provide a range of age classes: – Exotic trees with autumnal colouring are to be features; trees are to complement and enhance the built environment and historic settings, and not detract from items such as lamp standards and rural vistas; species selection is to consider the location of power lines, infrastructure and utilities; and the form of the tree is to be suitable for the location; – Replace missing trees in existing tree avenues; – Where appropriate plant avenues of trees in streets where they are absent; – Avenues of similar trees to maximise visual impact, using a combination of varying species with unifying elements of same or complementary foliage colour, tree

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	height or shape; – Where possible plant double rows of trees on wider street verges to provide a dense planting. A selection of two different species with similar forms can be used for visual impact; – Discourage parking on verges to avoid soil compaction, anaerobic growing conditions and poor access for tree maintenance; and – Improve pruning under power lines and/ or replace with smaller growing species.
S5. The prominent ridgelines and crests around Bathurst, such as Mt Panorama, Mt Stewart, White Gate and Wentworth Estates to be visually dominated by vegetation, not the built environment.	• Protect and enhance existing remnant vegetation (Refer Section 7); • Evergreen exotics and/or natives are recommended to be the predominant vegetation type in this area to provide a suitable visual backdrop throughout all seasons; and • Natives are suitable street trees in the larger rural subdivision areas.
S6. Enhance the streetscapes through strategic tree planting.	It is recommended that tree planting be undertaken in accordance with set priorities (Refer Actions). • Refer Theme recommendations (Refer Section 5); and • Plant replacement trees when required to undertake tree removals. HCAs – Bathurst, Rockley and Hill End • Refer S4. Perthville Village • Develop a street tree scheme to incorporate shade along footpaths, replace missing trees, and create plantings where trees are absent; • Liaise with the community over the street tree planting themes; • Utilise a combination of exotic and native trees to complement heritage areas and newer

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	subdivisions; • Consider the use of trees with coloured foliage in heritage areas; • Use species to provide for shade and drought tolerance; • Consider deciduous and semi-deciduous species for winter sun where solar access is important, whilst providing shade in summer; • Avoid planting under power lines or use small growing trees or large shrubs; • Planting will need to consider potential impacts of climate change and species selection should consider the use of native species that can survive in higher temperatures, potentially utilising species found in western parts of the bioregion; • Develop tree plans for larger roads including Bridge St, Bathurst St and Rockley St; • Consider planting themes for local roads such as Glenhaven Cres, Prince St, Tenison Woods Ave, Perth St, Apsley St, Church St, Colin St and Queen St; and • When planning for upgrades of the Brian Booth Recreation Ground, a complementary street tree scheme for North St and Seldon St should be developed. Other HCA Villages • Develop and implement a street tree planting scheme for the villages focussing on the main streets and entry points to the villages; • Liaise with the community regarding street tree theme; • Remove undesirable and priority weed species (Appendix D and G); • Utilise deciduous species within the HCA, retain remnant eucalypts and endemic local species on the outskirts to link to remnant native vegetation on rural roadsides; • Develop street tree schemes with species suitable for planting under power lines and within narrow road reserves; • Utilise species that enhance amenity, provide shade and winter deciduous species for solar

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	access; • Plan locations of specimens to frame heritage buildings whilst providing western and northern shade; • Consider use of species suitable for climate change impacts including species from the western parts of the region such as native conifers, Kurrajongs etc.; and • Plan plantings to allow for line of sight along road. Peel Village • Retain native vegetation community including trees and understorey plants along Wellington St, Church St and East St; and • Remediate gully erosion on eastern side of East St whilst retaining native vegetation through environmental engineering techniques. O'Connell Village • Maintain heritage plantings in a formal row with good spacing and replace senescent trees with appropriate exotic species. New residential and industrial areas • Refer to the DCP Design principles and DCP maps to incorporate native trees into a Landscape Plan for planting and fencing to Council's satisfaction prior to issue of subdivision certificates. Eglinton • Tree planting along roadside is needed to provide shade as there is no remaining vegetation. Plantings should consider the location of underground power services; and • Street tree planting required for shade, amenity and habitat. Kelso *Gilmour Street Buffer*

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	• Continue planting of local native and exotic trees in patches; and • Continue revegetation works to enhance connectivity, habitat values and visual amenity. *Sofala Road* • Continue avenue planting along eastern side of road for shade, amenity and thermal comfort; • Expand avenue planting along western side of street for shade, amenity and thermal comfort; and • Plant native canopy trees and shrubs in clumps. *Other areas* • Plant according to theme type; and • Replant where trees are absent.
OBJECTIVE 2: To provide a comfortable and aesthetically pleasing living environment for residents and visitors through judicious species selection and integrated design principles	
S7. Use of design principles to be fundamental to any streetscaping project.	• Adopt the design principles referred to in Section 9.3.6; • Refer Appendix D Species Lists; • Flower and foliage accent colours to compliment the earthy colours of the built environment and surrounding landscape, and as such should be muted warm colours (russet, earthy reds and yellows, gold, cream, blue and grey). Flower colours to avoid include bright, clear, colours such as orange/reds, canary yellows, and bold magenta and the modern cultivars of multi-coloured flowers; • Streets to be planted in avenues on both sides of the streets to maintain the formal grid pattern of roads and to provide unity and street character. Avenues essentially should be planted with species of trees that maximise the visual impact, such as the same foliage colour, tree height or shape. A polyculture stand of trees is less likely to be heavily damaged

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	by disease or insect infestation than a monoculture stand. To add interest, vary species between streets, or from a point where a natural or artificial feature changes (e.g. intersection, commercial to residential or gradient change); • Wide streets, particularly with wide nature strips, to accommodate medium to large trees and to be proportional to the scale of the street. Wide spacings are also necessary to allow for mature tree growth. Consideration should be given to the planting of double rows of trees on wider street verges to provide a dense planting, with a selection of two different species with similar forms can be used for visual impact; • On wide verges, plan for areas near trees where car-parking is discouraged to avoid compaction of soil, anaerobic growing conditions and allow for maintenance of tree plantings; • Narrow streets or lanes to be planted with small trees and at relatively close spacings to maintain unity. The elements of interest in these streets may be the front fences and cottage style dwellings. Trees in these situations would greatly improve the microclimate and should provide visual accents only with the architectural features still being predominant; • Trees need to be planted where they have become absent in the streetscape to improve the visual amenity (avenue formation, unity, interest, sense of character) and living environment; • Lamp standards to be the predominant focal point in streets where they are present. Trees in these streets to be on the kerbside, deciduous and less than 7 metres in height and widely spaced; • Blisters, roundabouts and median strip plantings to be in keeping with the cultural heritage theme, and therefore be planted with species of appropriate foliage and flower colouration. Contrast of plantings in lower maintenance areas to be provided by plant height and form and texture or colour contrast in the foliage (greys, reds, yellows). The bedding of perennial plants selected for their flowers are also recommended provided they conform to the desirable colour characteristics; • Plants in blisters, roundabouts and median strips to be selected for year round interest, ability to withstand severe frosts, extreme heat conditions and without the requirement of constant pruning to keep them contained. Low growing plants and those with a prostrate habit are desirable. Vegetation heights are to be maintained in accordance with road sight line clearance guidelines; and

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	• Consider the installation of raingardens and biofiltration systems and their associated trees and vegetation where they can be integrated with the street and drainage infrastructure. Use permeable surfaces around new street trees located within concrete or sealed verges to allow water to infiltrate into the root zone.
S8. Plant species selection needs to be founded on their aesthetic appeal, function, environmental value and contribution to the character or theme of an area.	• Refer to the design principles in Section 9.3.5; • Deciduous trees are to be used for solar access in winter and for summer shade. They are the ideal street tree in most parts where allotment size is small. Potential to reduce energy demands for residents and provides improved living environment; • Evergreens (native and exotic) are suitable in areas where solar access is not significant or where allotment size is relatively large, and the dwelling is setback from the road. Exotics add to the European cultural value of the City, whereas natives improve habitat value for fauna and can link areas of remnants. The relative values of using exotics or natives need to be considered in relation to the theme of the area; • English Elms and Golden Elms are to be removed from the planting list due to attack from Elm leaf beetle; • Trees selected to consider road function – i.e. passage of heavy vehicles need higher clearance than cars and therefore trees need to be free of low branches through crown lifting. Trees need to have the potential for canopy lifting; • Narrow streets or where shading already exists due to other structures, select trees with open canopies and do not lop; • Consider planting trees with another use (e.g. nut trees in open space areas); • A combination of species in a street can be used to good visual effect to create an informal streetscape if some unifying element, such as foliage colour, tree height or form, type (e.g. all native, all broad domed deciduous) is the same; • No planting of trees along the medians in the HCA (except for William Street between Rocket and Piper Street); • Planting on the carriageway must be relatively wide where car parking is a premium;

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	• Where overhead power lines are an issue, there are a number of options: – Plant small trees on both sides of the street where street widths are narrow; – Plant large trees on the side with no power lines and small trees under the power lines. Negative aspect – it creates a visual imbalance and loses its avenue effect; and – Plant large trees on both sides of the street, offset from the power lines if possible, and 'directionally' prune when the trees are young by qualified arborculturists. Negative aspect –maintenance requirement.
S9. Landscape key areas to visually screen out unsympathetic views, to soften the built environment and to provide a buffer between differing land uses.	• The type of vegetation to be guided by the vegetation theme areas (Refer Section 5); • To reduce the reliance on water resources, to improve the connectivity of remnant vegetation and to provide habitat for native birds, it is recommended that these screens or buffers be predominately native shrubs and small trees, even in areas such as Eglinton Road, Abercrombie; • The maximum height to be determined by considerations such as view, height of elements to be screened, scale of surrounds and presence of overhead power lines. Suggested foreground plantings to be of lower growing shrubs, groundcovers and mass plantings of grasses or grass like plants; • The screen planting to be continuous or massed in large groups with slashed surrounds. The surface to be covered with bark chips or other suitable organic material; and • In many instances, screen plantings can be incorporated with the standard street trees plantings where the road reserve is accommodating enough. Recommended screen areas include: • The newer subdivision areas where Colorbond fences fronting arterial roads, highways, streets or parks need to be visually screened; • Screen out residential and industrial zones along gateway entrances to the City. Retail premises with 'shop front' excluded; and

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	• Industrial and bulky goods areas.
S10. Use the streetscape to add character to new subdivision areas, which all look similar and lack a local identity.	• To add character in newer subdivision areas, group plantings, rather than creating formal avenues. Consider alternating groups of trees with textural and colour contrast. Character can also be based on some vegetation feature such as a predominant foliage colour or vegetation type; and • Break up urban development with unique landscapes of native vegetation, such as the revegetation and development of a cycle track along Sawpit Creek and introducing native trees and shrubs in drainage reserves and watercourses (Refer Section 8 Waterways for recommendations and guidelines).
S11. Use streetscapes vegetation to improve the visual amenity of industrial and bulky goods retail areas.	• Refer 'DCP – Business and Industrial Development' for guidelines; • Refer Map A for suitable theme type; • Ensure landscaping complies with DCP guidelines and it has been undertaken; • The plantings to be in scale with the buildings and allotment size to create a woodland setting; and • Screening of industrial zones screens or buffers to be predominately native shrubs and small trees and as per S9.
OBJECTIVE 3: To integrate and link the streetscape plantings with areas of remnant vegetation, key access ways and main arterial roads	
S12. Enhance the visual appearance of streets through street tree planting to create a link with areas of remnant vegetation, key access ways and/or main arterial roads.	• Undertake annual street tree planting program including the planting and replacement of trees; • Avenue plantings of similar shape, form or coloured species where possible; and • Plant large-scale trees with good bole length to retain vistas to outlying landscapes.
S13. Main arterial roads to be landscaped to reflect and enhance the theme of the area, be aesthetically	*Durham Street* • Continue implementing the Durham Street Landscape Plan including tall plantings and

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
pleasing, avoid hazards to road users, pedestrians and cyclists and to provide for a suitable microclimate.	plantings reflective of trees on both sides of the road. Where possible underground cabling of electricity between Bentinck and George Streets. Pruning regimes for newly planted trees should also be similar to that conducted on the eastern side. *Stewart Street* • Continue planting of footpaths with medium to large trees to reflect the scale of the dual carriageway. Constraints of overhead power lines, residential allotments located close to the front boundaries and traffic hazards would require species selected for their ability to be crown lifted, directionally pruned and pollution tolerance. Trees with a strong tendency for horizontal branching should also be avoided; • An avenue effect of the visually similar species is recommended to accentuate the rural vistas, provide unity and provide strong visual impact. A suggested species includes the golden and claret ash provided overhead power lines are removed; • Planting along the median strip to be restricted to low growing shrubs (< 0.5 m), or grass like plants such as the existing *Dietes sp*. to maintain adequate sight distance for traffic safety; • The visual appearance of the median strip to be improved through weed control measures, tree removal, upkeep of existing plantings, retention of mono-specific plants, fertiliser application, replanting in voids and supplementary watering when and where required. (Note: A regular light application of fertiliser improves the drought tolerance of the plants by increasing their root mass and overall functioning). *Cycleways* • Avoid planting shrubs immediately adjacent to cycleways to prevent branches causing injuries and to lessen the security risk.
OBJECTIVE 4: To maintain street trees in good health and desirable form	
S14. Adopt appropriate arboricultural principles in the endeavour to extend the life-span of the tree, maintain street trees in good health, desired form and with high	• Underground cabling of electricity can cause extensive root damage to existing mature trees and needs to be considered in any future planning;

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
aesthetic value.	• Improving the health of the street trees increases their longevity and aesthetic value while reducing the time required for replacement; • Lopping of old trees or pruning of their large branches is deleterious and often causes terminal decline, as the wounds never close over and become the entry points for decay causing disease and insect borers. The smaller wounds on younger trees are capable of callousing over; • The pruning of trees under power lines is a requirement for the Overhead Line Construction and Maintenance Regulations, 1962. The *Electricity Development Act 1945* require trees to be trimmed to prevent contact with aerial conductors of any overhead line; and • Trees and landscaping should be subject to regular maintenance to ensure that they do not become overgrown or hazardous to pedestrian movement, including growth overhead and root damage to pavement surfaces. *Directionally prune and protect* • Crownlift, crown reduce or centre prune street trees in the early stages of growth to reduce future pruning requirements. Directional pruning can slow down growth by reducing apical dominance, achieves desired form and avoids massive and often deleterious pruning cuts when the trees are large. This measure should be undertaken gradually to prevent wind lodging, sunburn to the trunk and excessive growth of terminal shoots. Broad domed trees are suitable for this treatment; and • Protect new tree plantings with sturdy tree guards to promote good growth form and prevent physical damage. *Avoid lopping and heavy pruning* Undesirable outcomes: • Can alter the root to crown ratio; • Can lead to increased root growth; • Can cause decay;

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	• Can promote excessive root growth; • Produce weak branches; • Creates an unnaturally dense canopy which can obstruct street lighting; and • Trees grow back with increased vigour, further increasing maintenance costs. Some lopping practices can be avoided by pruning branches back to branch collars. Do not flush cut. *Select suitable species* • Avoid planting trees under power lines which will require extensive pruning or will lose their natural form (large trees or those with apical dominance); • Select species that are not apically dominant (such as Eucalypts, Liquidambar, Poplars and Conifers) as street trees where pruning under power lines would be anticipated; • Select deep rooted trees that are small to medium at maturity and are suited to harsh environments; • Select appropriate species to avoid unnecessary and often damaging pruning and to reduce future pruning costs; • Use of aerial bundled conductor for low voltage reduces tree clearance to about 55 mm. Underground cabling can interfere with roots of existing trees; and • Avoid problems with future pavement distortion and kerb damage by planting trees in large holes.
S15. Remove severely diseased or dying trees at the point where their aesthetic value is decreasing and their management costs and hazard ranking are increasing.	• Inform relevant community bodies of any significant tree removal activities to ensure their support; • Single trees can be removed when appropriate, though with groups of trees (such as in an avenue), their ultimate removal may need to be staged to prevent a negative visual impact. This must be assessed on a case by case basis, as re-establishment may be difficult with

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	existing trees in close proximity; • Senescent trees should be retained as habitat structures if significant tree hollows are present, provided they do not pose safety concerns. Nest boxes installed, or augmented hollows created to offset the loss of hollows at a 2:1 ratio; • Diseased or dying trees that are removed should be replaced to maintain canopy cover. Some trees are in a state of terminal decline and maintenance inputs will increase as the tree ages, with the aesthetic and ecological value decreasing. A high cost to benefit ratio warrants tree removal and replacement; • Mature trees that have been lopped and/or pruned of large branches are destined to die prematurely as the large wounds provide entry of decay causing disease and wood boring insects and their overall vigour is diminished. Structurally they are prone to limb loss and being blown over and aesthetically they have depreciated value; • Remedial action on some severely diseased trees that have the potential to become dangerous may not be practical. In these situations, removal becomes the preferred option; • If trees within a group or avenue are retained until their death, the amenity value is decreased, and maintenance costs, hazards and litigation can increase; and • The aesthetic return from a tree starts low and steadily increases to maturity where it plateaus for a period until it becomes over mature or senescent. At this later stage in the tree's life the aesthetic value becomes increasingly depreciated at the same time as costs to manage the tree increase. Maintain a high level of aesthetic value for as long as possible prior to replacement.
S16. Undertake periodic tree health surveys of urban street trees and develop a street tree inventory database.	• Update the Street Tree Audit inventory for HCAs. • Undertake a Street Tree Audit inventory for the remainder of Bathurst City streetscapes as resources permit. • Budgets and priorities can be developed in accordance with survey results; • Surveys can be used to generate lists of trees requiring specific management actions with the data base designed to accommodate for continued updating;

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	• Systematic surveys allow for determinations to be made in relation to the aesthetic value of single trees. This information can then be used to determine the critical point for tree removal and replacement; and • Surveys and developed inventories to give a relative monetary value on trees to assist in management decisions (e.g. removal, worth restoration work, value of tree outweighs costs to damaging infrastructure etc.).
S17. Adopt drought and climate change management strategies to counteract the adverse effects of extended dry periods and increased temperatures on street trees.	• Develop multi-pronged guidelines to manage newly established street trees, trees of high value (gateway specimens) or heritage trees for variable dry period conditions and increased temperatures; • Selection of suitable species for the environment and changing climate will reduce the consequences of drought, particularly in areas where supplementary watering is not an option; • Supplementary watering, weed management, and mulching may be required for newly established plantings, especially in times of low water availability; and • Where the physical or chemical properties of the soil are not conducive to good growth and establishment, soil remediation may be necessary to reduce future management costs and potential tree replacement.
OBJECTIVE 5: To appropriately locate trees in the road reserves, along with suitable species selection to maximise the street tree effect while considering constraints of safety, utility services and road and tree maintenance.	
S18. Consider recommendations during treescaping projects.	• Refer Appendix D Species Lists; • Tree species selection needs to be flexible, taking into consideration soils, elevation, climate influences, specific site location and restrictions, theme of the area and availability of tree species. The selection and placement of trees for streetscapes should be determined by Council tree managers whom are qualified and experienced in selecting tree species. • Trees that are highly susceptible to disease and pest should be avoided in plant selections

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	e.g. English Elms due to Elm Leaf Beetle. • Spacings to consider solar radiation, scale of the plantings and the desired effect. Gaps between trees sets up a rhythm and is an effective landscape tool in the urban environment; • Plantings are not to obstruct sight distances. Particular care to be taken around curves, near intersections and driveways; • Non-frangible trees planted near road verges and medians to have a mature diameter of less than 100mm; • 4.5 metre footpaths allow for 0.95 metres for street tree planting; • New subdivisions with a less formal street layout can be enhanced with a less formal street tree layout. Currently equidistant plantings, with one tree per allotment sets up a formal, sterile streetscape. Groupings of trees can introduce interest in these situations; • For arterial roads, plant trees >2.5 metres from the road edge; • Frangible trees plant >1 metre from road edge; • For local roads the main safety consideration is sight distance; • Small trees and shrubs can cause visibility problems for road users, provide little shade and may be of a scale unsuitable for the area; • Select tree species and consider location of trees to avoid the obstruction of street lamps, traffic lights, views and buildings; • Street tree canopies need a ground clearance of 2.5 metres to be clear of pedestrian and vehicular traffic; and • In areas utilised by heavy vehicles, the ground clearance needs to be 4.3 metres in height. *Planting within carriageway* • Reduces interference of trees with power lines and underground services; • Can visually obstruct views if large species are selected;

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	• Only suitable for wide roads; • Limits parking availability; and • Vehicular accidents and damage resulting from collision with trees.
S19. Remove overhead powerlines as an on-going process to enhance the streetscape.	• Underground cabling of electricity can cause extensive root damage to existing mature trees and needs to be considered in any future planning; • Target areas include the Bathurst CBD, gateways and major arterial roads; • Ensure that electricity access pits are not located near trees; and • Use appropriate best practice trenchless techniques such as microtunnelling for installation of conduits under existing trees as opposed to open trenching to minimise impacts on trees.
OBJECTIVE 7 Street trees in the village of Raglan to accommodate for the aerodrome clearance requirements	
S20. Heights of mature street trees to be within the height limitations specified by the Civil Aviation Safety Authority.	• Tree heights above the allowable limit set out by the Civil Aviation Safety Authority need to be controlled through pruning or removal. To avoid unnecessary maintenance, it is recommended that species be selected that reach mature heights below this limit; • It is recommended that trees that are constantly maintained to be within the allowable limit be removed and replaced with appropriate species; • All trees in the north-eastern most corner of Raglan (in the block bounded by Christie, Locke and Eugene Streets) to be less than 8 m; • Heights can increase to the south-west of the block with the maximum allowable height being 15 m; • In the blocks including the Raglan Sports Complex and those between Locke and Eugene Streets the height restrictions vary from around 20 – 30 m. It is recommended that a maximum of 20 m be used as a practical guide; and • Residents within the flight paths to be kept informed about height restrictions of trees to

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
	prevent inappropriate private planting.
OBJECTIVE 6: To reduce the heat island effect in car parks by increased tree planting and tree care	
S21. Increase tree planting in car parks to improve the living environment.	Key car parks are: • Car park behind the R.S.L. • Russell Street car park; and • Library car park (stage 2)
S22. Select tree species suitable for the car park environment.	• Refer Appendix D Species Lists; • Plant deciduous trees for summer shade and winter sun; • Do not plant eucalypts where cars park; • Select trees with spreading or horizontal branches; • Trees must be suitable for hot, dry summers and cold, frosty winters, and resilient to increased temperature and reduced rainfall; and • Avoid trees bearing fleshy fruit.
S23. Adopt tree care principles to ensure maximum benefit from trees and	• Protect trees through the provision of adequate tree guards; • Encourage healthy growth by providing an appropriate growing environment (e.g. garden islands, open grates or other permeable surface around trunk); • Crown lift to improve clearance; • Supplementary irrigate and fertilise trees to encourage healthy growth, especially in the first two years of establishment, funding permitting; • Do not lop as this will encourage weakly attached branches and an upright habit; and • Replaced trees that fail or need to be removed.

Table 9 Streetscape Strategies	
Strategies	**Recommendations/Guidelines**
S24. Consider WSUD principles to capture, treat and reuse stormwater within carparks.	• New or redeveloped car parks to consider the use of trees in urban raingardens, swales and other WSUD concepts.
OBJECTIVE 9 To incorporate the VMP into local planning studies and provisions	
S25. Vegetation to be implemented within the landscaping requirements of the Development Control Plan for new development areas.	• Implement the DCPs in relation to landscape and VMP requirements.

9.4.3 Actions

Table 10 Streetscape Actions		
Action	**Strategy Identifier**	**Importance Ranking (1-highest, 4-lowest)**
Continue to investigate opportunities for additional tree plantings within CBD Areas with the aim of increasing canopy cover.	S4, S6	1
Plant trees in new residential and industrial areas.	S6	2
Continue to plant replacement trees when required to undertake tree removals.	S6	1
Replant trees in the HCAs.	S6	1
Undertake screen plantings.	S9	1
Create treed linkages .	S12	2
Plant/replace trees along main arterial roads: • Eglinton Road; • Hamilton Street, Eglinton; • Peel Road; • O'Connell Road; • Stewart Street; and • Durham Street.	S13	2
Increase tree planting in Council car parks.	S21	3

10 PARKS AND PUBLIC RESERVES

10.1 VISION

The parks and public reserves in the Bathurst Regional LGA are to reflect the identity of the surrounding natural landscape and built environment while servicing the community with the greatest function.

10.2 INTRODUCTION

This section covers the parks and gardens, public reserves, recreational facilities and open space areas in the Bathurst Regional LGA, including the villages of Eglinton, Perthville, Raglan, Rockley, Trunkey Creek, Peel, Wattle Flat, Sofala, Hill End, Napoleon Reef, Yetholme and Kelso. The focus in the urban environment where parks and reserves range from high maintenance parks such as Kings Parade to low maintenance and low functional reserves within residential zones.

Open space areas in the riverine or watercourse environments are covered in Section 8 of this report. Likewise Section 7 deals specifically with the management of the park and reserves with remnant vegetation.

Strategies and recommendations relating to sporting facilities, infrastructure and other non-vegetation related inclusions are not addressed in this VMP. Many of these aspects will be addressed in the Bathurst 2040 Open Space Strategy.

MAP REFERENCES

Map A - Vegetation Themes

Map B – Significant Vegetation and Natural Landscapes

Map E - Site Specific Projects

10.3 BACKGROUND

10.3.1 Values

The values of the parks and open space areas are as diverse as their function. They reflect the strong sporting, recreational and amenity needs of the community in the Bathurst Regional LGA. The parks and open space areas:

- Contribute to the heritage value in the HCAs, especially historic and high amenity parks such as Kings Parade and Machattie Park and showgrounds such as Sofala;
- Provide a range of parks giving passive recreation opportunities to the local community and to visitors;
- Attract visitors to the region;
- Provide respite and other social values to the community;
- Add to the overall identity of the Bathurst City and rural villages and localities;
- Improve the aesthetic value of the surrounding area;
- Function as local access ways; and
- Retain vestiges of remnant vegetation and are important stepping stones to other remnants.

10.3.2 Issues and Threats

A number of issues and threats are recognised and have been supported during the community consultation phase and literature review. It is to be noted that these issues do not apply to all parks.

The issues identified are:

- Lack of shade trees;
- Low functionality of open space areas;
- Inefficient use of open space areas (i.e. too many areas underutilised with significant Council resources required to maintain them);
- Poor aesthetic quality;
- Dedication of unsuitable land parcels as part of a development or subdivision;

- Need to incorporate Crime Prevention Through Environmental Design Principles (CPTED) in the design and upgrade of open space reserves. This includes surveillance, access control, territorial reinforcement and space management. These may be applied to parks and public reserves considering the following:
    - Parks and facilities that are readily maintained facilities and landscaping that communicates an active presence is occupying the space;
    - Outdoor spaces with more trees are seen as significantly more attractive, more safe, and more likely to be used than similar spaces without trees;
    - Amenities such as seating or playgrounds in common areas setting helps to attract larger numbers of desired users;
    - Clear sightlines between public and private places;
    - Effective lighting of public places where applicable; and
    - Landscaping that makes places attractive, but does not provide offenders with a place to hide or entrap victims.

Threats, either real or potential include:

- Vandalism;
- Tree decline due to injury or other stress factor such as drought and climate change;
- Change in land use;
- Low maintenance input;
- Inadequate budget;
- Weed invasion and pest animals; and
- Unauthorised vehicle access.

10.3.3 Heritage Significant Parks

A number of parks have significance in contributing to the heritage value of the Bathurst Regional LGA. They are listed below with a brief description of their nature of significance.

a) Bathurst

Kings Parade

Lot 1 Section 71 DP 758065, Crown Reserve R590110 for Public Recreation, Council Trustee, and Russell Street, Bathurst.

Kings Parade is locally listed in the Bathurst Regional LEP and was formerly nationally listed on the Australian Heritage Database (AHD - National Heritage Register – now archived). This describes Kings Park and Machattie Park (see below):

'*In addition to the various buildings contained within the Central Conservation Area, there are streets which are distinctive for their width and decorative, centrally placed lamps, and In addition to the various buildings contained within the Central Conservation Area, there are streets which are distinctive for their width and decorative, centrally placed lamps, and there are two important open spaces. These are the King's Parade park on which stand the Carillon, the Boer War Memorial and the George Evans Monument, and Machattie Park which is Bathurst's main park. Machattie, designed in 1891 by James Hine and standing on the site of the earlier gaol, is a good example of a Boom style park and is important for the way in which it combines axial layout, use of terminii and formal tree planting with natural shaped water forms. A number of furnishings, monuments and other structures stand in the park*.'

Kings Parade offers a major formal open space in Bathurst and is a pivotal element in the Bathurst town square. It is a focus of many of the major civic and ecclesiastical buildings of great historical and cultural significance. Dominated visually by the Carillon Tower, the landscaped space includes cast iron seats, lamp standards and formal plantings.

Machattie Park

Lot 1 Section 6 DP 758065 Crown Reserve R590114 for Public Recreation, Council Trustee, William Street, Bathurst.

Machattie Park is locally listed in the Bathurst Regional LEP and formerly was nationally

listed on the AHD (National Heritage Register – now archived). The AHD has the following listing for Machattie Park:

'*A late nineteenth century country town park with original planting, historic ornaments, and later furnishings and monuments, some of which is not significant. The park was laid out on the gaol site in 1890-91 to the design of Mr James Hine and named in honour of Dr Thomas Machattie, thrice Mayor of Bathurst. It is basically geometrical in plan with minor informal details and winding walks with some subsequent alterations particularly to the William Street frontage. A row of elms and a border path, now partially removed, surround the park which was originally fenced. Cross and diagonal paths subdivide the central space, intersecting at or terminating in the various features and monuments; notably the large and elaborate cast iron fountain and basin (1891), the octagonal timber band rotunda (designed by Hine) within the large central circle and the irregular kidney shaped pond along the north/south axis. While elms border the park, the principal planting within is of cedars with a few magnolias and bunyas a delightful Queen Anne lodge, or caretaker's cottage (also designed by Hine), is situated at the corner of the smaller L-shaped extension of the park to the north. The principle later additions and alterations are the Brooke-Moore Memorial (1937) at the south-east corner, the relandscaping with cotoneasters, pyracantha, herbaceous plants and paving at the north-east corner, the Memorial Gates (1935) along the central axis near the pond and modern seating along the path from the lodge to the central band rotunda*.'

Centennial Park

Lot 1 DP 134733 Crown Reserve R590113 Reserve for Public Recreation, Council Reserve Trustee.

Centennial Park, bounded by Bentinck, Lambert, Seymour and Rocket Streets was dedicated as a public park to commemorate 100 years of settlement in Australia. It is locally listed in the Bathurst Regional LEP

The park is noted for its planted exotic and native trees and wide expanses of mown lawn, access paths and shelters. Despite having low recreational and visual amenity value, it is afforded pleasant views, is centrally located in the HCA and is situated along busy sections of Bentinck and Rocket Streets.

Options for its future use are currently being scoped and considered.

Victoria Park

Lot 1 DP 134801. Crown Reserve R590111, Council Trustee of Victoria Hospital Park.

Victoria Park lies opposite the Bathurst Base Hospital and is bounded by Mitre, Durham, Hope and Howick Streets. It is locally listed in the Bathurst Regional LEP.

The park is noted for its planted exotic and native trees and wide expanses of mown lawn, access paths and shelters.

An Adventure Playground Stage 1 and a Bike Education Track have been constructed in Victoria Park. Stage 2 of the Adventure Playground has been designed.

Okuma Garden, Peace and Bicentennial Park

Stanley, William Streets; Lot 1 DP 12607, Lot 1 126051, Community Land; Lot 7039 DP 1052368 Crown Reserve R190119 for Public Recreation.

The statement of significance for the item listed in the Bathurst Regional LEP Heritage Register states:

'*Located near the site of the first bridge leading to Bathurst, an interpretive sign tells the story. Other important components of this large municipal park located beside the Macquarie River are a heritage wall commemorating early settlers, a time capsule buried nearby, a stone cairn that celebrates the location where Gov. Macquarie proclaimed the town of Bathurst, a Peace Park, the Okuma Japanese gardens. A major sculpture in the Bicentennial Park is called 'a conversation' and many special plantings. This is an exceptional people's park in size, beauty and commemoration*.'

The southern part of Bicentennial Park in Kendall Avenue (Lot 4 DP 747979, Operational Land) is not part of the Heritage Item but falls within the Bathurst Urban Conservation Area.

Bicentennial Park is a large urban park within the Macquarie River parklands. It is located near a vehicle crossing constructed in at least

1894 and replaced in 1937 by Council with funding assistance from RG Edgell. This narrow timber bridge was later replaced in 1995 with a concrete bridge.

The Bicentennial Park features a heritage wall in half circles commemorating early settlers in the district, a time capsule and a 1930 stone cairn that celebrates the location where Gov. Macquarie proclaimed the town of Bathurst.

The Peace Park or garden was opened by the High Commissioner of India in 1956. It features a bust of Nehru and a sunken garden that is circular in form, with many masonry blocks depicting symbolism for the many depictions of 'peace', versions of a cross, and other elements including animals. The garden was restored in 1988.

The Okuma Japanese gardens were opened in 1998 in commemoration of the sister-city relationship between Okuma and Bathurst. A plaque, sculpture and garden featuring a Japanese Elm tree recording the 10th anniversary of this relationship. It features numerous special plantings including flowering cherries planted to commemorate the signing of the agreement for the 'sister-city' relationship.

Other Reserves within Bathurst HCA

Several other reserves fall within the Bathurst Urban Conservation Area that is listed in the Bathurst Regional LEP:

- ***Cousens Park*** Kendall Avenue, Lot 1521 DP 1134894, Crown Reserve R26087 for Public Recreation. A small open space area adjoining Denison Bridge providing scenic amenity at the eastern entry to Bathurst with exotic plantings, mown lawns and pathways;
- ***Baillie Street Open Space*** Baillie Street, Kendall Avenue, Lot 8 DP 1032436, Community Land; Lot 2 DP 1029078, Lot 3 DP 1032468, Lot 5 DP 1015387, Operational Land. Largely cleared area of land with small stands of remnant vegetation on the foreshore of the Macquarie River with a flood levee; has significant potential for riparian restoration and revegetation;
- ***Snudden Open Space Reserve*** Baillie Street Lot 42 DP 1035358 Community Land. Open space consisting of lawn, some stands of remnant Casuarina forest and flood levee. Riparian restoration has occurred along the Macquarie River bank.
- ***Macquarie Playground Park*** William Street, Lots 2 & 5, DP 1179068, Lot 4 DP 728893, Crown Reserve R590117 for Public Recreation. A developed playground in the vicinity of Bicentennial Park, featuring significant exotic tree plantings and remnant vegetation around the watercourse on the eastern side of the reserve.

b) Perthville

Two reserves fall within the Perthville Village Conservation Area that are listed on the Bathurst Regional LEP. The village is noted for its blue stone houses, blue stone hotel, churches and convent and the Perthville Bridge.

Bridge Street Park, Perthville

Bridge Street, Perthville; Lot 15 DP 246890 Community land.

Located in the centre of the village near the Bridge, it is a small underutilised park with a swing set and several large remnant eucalypt trees and undesirable species including poplars.

There is potential to revegetate the riparian zone, and create informal walking track linkages to the open space land further north and south along the Queen Charlotte Vale Creek. Any plantings should utilise preferred koala food trees as they have been recorded in the area.

Village Square and Tennis Courts, Perthville

Prince Street, Perthville; Lot 1 DP 1232903 Operational land.

The park is located near the convent and school and has planted mature native trees some of which are suffering from dieback. The cause of dieback in areas of poor drainage needs to be investigated and canopy trees replaced in planted rows. There is also scope for additional planting of trees around the tennis courts.

Council has prepared a Concept Plan for the Perthville Village Square to upgrade the sports courts and provide facilities such as BBQs, open space, war memorial, public toilets, a

nature playground, fitness stations and paths. It includes plans to retain existing trees and supplement them with tree, shrub and groundcover plantings. The modification of the grassed swale on the eastern and northern edges is also proposed to improve habitat for native fauna. Plantings should include preferred koala food trees, with the species being known from the area.

c) Peel

Two reserves fall within the Peel Village Conservation Area listed in the Bathurst Regional LEP.

East Street Operational Land

East Street, Lot 11, DP 820998, Lot 53 DP 820932 (unmade road reserve).

The part of this reserve in the HCA includes large aged specimens of Monterey Pine that may have formed part of an old shelter belt or driveway planting.

The remainder of the reserve has been cleared with substantial erosion gullies and weed invasion, with a smaller area of Box-Gum Woodland on the western side. The erosion and weed invasion require remediation.

Wellington Street Operational Land

Wellington Street, Lots 11 & 12 DP 758833, Operational Land.

The grazed land has remnant trees of Box-Gum Woodland on the northern part, cleared land and a watercourse with erosion on the southern part. The erosion needs to be stabilised.

d) Rockley

Two reserves fall within the Rockley Village Urban Conservation Area that is listed on the Bathurst Regional LEP.

Rockley Sportsground

Budden Street, Rockley; Rockley Sportsground (R84116) Reserve Trust Lot 7002 DP 1028627.

The sportsground is an important location within Rockley catering for active uses. It has well used but ageing infrastructure; and lacks shade trees and visual amenity. The sportsground can be enhanced through incorporating a planting scheme with an avenue of trees on the northern boundary, and upgraded facilities.

Rockley Crown Reserves including Stephens Park

Hill and Budden Streets, Lot 701 DP 94679 Crown Reserve R75988 for Public Recreation (devolves to Council), Lot 7002 DP 1000974 R9224 Crown Reserve for Water Supply, Lot 7001 DP 1028627 and Lot 7003 DP 1000974 Crown Reserve R85090 Public Baths – Public Recreation.

The reserves consist of land along Peppers Creek to the east and west of Hill Street including Stevens Park, War Memorial, weir and remnant Box-Gum Woodland on the northern side of the creek continuing to the sportsground site. Large Elm trees and Willows occur in the riparian zone on the land east of Hill Street. The land to the west of Hill Street has a wire fence deterring public access and is mown with the narrow fringing riparian vegetation sprayed. The lack of riparian vegetation and excess nutrient runoff exhibits as algae in the creek. Vegetation to the north of the creek is weedy with Willow, Broom, Cotoneaster, Hawthorn and Ivy.

The majority of the land, except Lot 701, is not currently managed by Council. Management of Lot 701 needs to include planting of the riparian zone with ground covers, shrubs and sedges, and removal of the fence if not required, following liaison with the adjoining landowner. Management of the remaining Crown land should include a program of riparian restoration, tree replacement, revegetation and bush regeneration of the more resilient vegetation by the land manager.

e) Sofala

The reserves that fall within the Sofala Village Urban Conservation Area are listed on the Bathurst Regional LEP. Located on the riverbank in the floor of a steep sided valley, Sofala is listed for its buildings, narrow streets and historic association with the gold rush and Chinese population.

The whole village is significant by virtue of its historical importance and its topographical position.

Joyce Pearce Memorial Park

Lots 19, 20, DP 758908 Lot 29 DP 1073729 Operational land, Lots 21-28 DP 758908 Community land.

Joyce Pearce Memorial Park contributes to the picturesque and aesthetic values of the village which has an informal layout reminiscent of the mid-Victorian period. The park forms an important focal point in the village. The Elms planted in the park have been invaded by a number of weed species including Honey Locust, Tree of Heaven, Privet, Hemlock and Thistle. The riparian zone includes Casuarinas and weed species.

A flood mitigation project is underway including vegetation clearing and bush regeneration with more appropriate species. This includes weed tree replacement, weed control and riparian revegetation.

Lucky Point Reserve, Sofala

Crown Reserve 85383 for Public Recreation. Council Reserve Trustee Lot 7021 DP 1124360.

As the centre of a major New South Wales goldfield during the 1850s and early 1860s, Sofala often led the colony in gold production and population. Lucky Point Reserve on the Turon River formed part of the gold workings. It is known for the water diversion tunnel that diverted the main flow of water away from the bend during the gold rush, to make it easier to find alluvial gold deposits. It currently provides access to the river and camping, however has no facilities. Along the river is a narrow band of riparian vegetation with weed invasion at the edges. Weeds also occur on the cleared land including Serrated Tussock.

10.3.4 Other Parks and Reserves

a) Abercrombie

Abercrombie Estate Open Space

Abercrombie Drive, Abercrombie; Lot 41 DP 811413 Lots 23-25 DP 807432, Lot 53 D 815555, Lot 99 DP 829959, Lot 220 DP 833517, Lot 330 DP 838636 Community land.

The park is an elongated reserve planted with an avenue of trees along the multi-use access pathway and has a strong aesthetic quality. There is potential for planting of some of the larger expanses of mown lawn to create a habitat linkage along the open space corridor.

River View Estate Park

Dunoon Place, Abercrombie; Lot 34 DP 844225, Lot 29 DP 866653 Community Land.

The park is a substantial sized local park and is well maintained with play equipment however it lacks shade trees.

The park has potential for increased plantings of shade trees and understorey to enhance visual amenity and improve habitat values.

O'Keefe Park and Rankens Bridge Park

Eglinton Road, Abercrombie, Rankens Bridge Road, Eglinton ; Lot 4 DP 786946, Community land; Lot 99 DP 864476, Lot 103 DP 1006130, Lot 92 DO 865590, Operational land; Lot 10 DP 872516 Crown Reserve R 1011910 for Public Recreation, Council Trustee.

O'Keefe Park and Rankens Bridge Reserve fronts the Macquarie River at Abercrombie. The riparian zone was previously dominated by willows and exotic groundcover plants, with unrestricted vehicle access creating tracks around the park and to the river.

The degraded riparian zone has been restored by planting trees along the riverbank that will also provide habitat for the Regent Honeyeater. The seed production area comprises plants for both Casuarina Gallery Forest and Box-Gum Woodland restoration works that will be available for future revegetation projects. The grid planting of eucalypts will make the planting both visually spectacular and easy to maintain.

A well maintained park with rural and floodplain vistas, it provides access to the river and is near a main arterial road, the village of Eglinton and extensive residential development in the area. The site has a concrete access path along the roadside which connects Eglinton with Bathurst City at Esrom Street.

b) Eglinton

Cubis Park and Eglinton Oval

Alexander Street, Eglinton; Lots 3&4 DP 819556 Community land, Lot 72 DP 1136842 Crown Reserve Eglinton Public Park (R590071) Reserve Trust, Council Trustees. S53 Lease; Lot 88 DP 755779 Eglinton War Memorial (Hall Site) (R590132) Reserve Trust Dedication S53 Lease.

The park and oval are well maintained sports grounds that have some shade trees.

There is potential for increased planting on the western boundary, around the tennis courts along the southern boundary to shade the pathway.

Coxs Place Reserve, Lamont Open Space Reserve and Oates Place

Cox Street, Lamont Street, Park Street and Oates Place, Eglinton; Lots 20 & 36 DP 249930, Lot 27 DP 247918, Lot 13 DP 263589, Lot 11 DP 247918 Community land.

The small pocket parks provide access links and green space within the suburb. An increase in plantings of shade trees and understorey would provide habitat, screen / buffer urban fence lines and enhance visual amenity and access.

In Oates Place weeds occur in the access way; the reserve could be enhanced by weed control, plantings and a formalised walkway, seating and the potential addition of play equipment.

c) Llanarth

Darwin Drive Open Space Reserve

Eglinton Road and Darwin Drive, Llanarth; Lot 43 DP 1059396 Operational land.

The large detention basin and open space provides for active recreation and has plantings of native species to provide a habitat linkage.

There is scope for additional planting near the pathway to provide shade on the south western bank of the detention basin and to enhance vegetation linkage plantings to the south.

Evernden Road Open Space

Evernden Road, Llanarth; Lot 44 DP 259103 Community land.

The park is a well maintained passive open space reserve with planted native and exotic species. There is scope to remove some areas of grass underneath the trees and to mulch and plant with native understorey species. These plantings would extend the vegetation linkage from the Darwin Drive Reserve.

Freeman Circuit Open Space

Lot 918 DP 1191778 Community land.

The large undeveloped park consists entirely of mown grass. A landscape design for the park has been prepared in consultation with the community. The major elements of the design include lighting, a path network, picnic shelters and seating, native and exotic mix of trees and shrubs, mass planting of native garden areas, irrigated open space areas, and a playground.

Hawkins Park, Rutherford Place and Bradwardine Road Reserve Open Space

Bradwardine Drive, Llanarth; Lot 224 DP 249576, Lot 88 DP 249485 (part operational, part community), Lot 89 DP 249485, Lot 68 DP 848393 Community land.

Part of a network of parks that buffer the developments from Bradwardine Road, the reserves provide passive open space and visual amenity. They contain mature planted native trees and grass, with some small patches of unmown vegetation around trees, and small revegetation area.

The reserves have the scope for additional replanting to create a stepping stone linkage to the Macquarie River.

Llanarth Drainage Reserve

Bradwardine Drive, Llanarth; Lot 15 DP 1049399 Operational land.

The drainage reserve consists of mown grass, with some areas of weed invasion and a lack of native vegetation. The small retention basin is overgrown with weeds that need to be treated and replaced with suitable aquatic

vegetation which will also assist to treat water quality.

There are opportunities for enhancement with vegetation to improve visual amenity and provide habitat linkages, as well as through the construction of a walking track. A chain of ponds wetland system within the reserve would also improve water quality for flows entering the Macquarie River system.

Walmer Park

Bradwardine Drive, Llanarth; Lot 2 DP 1140980 Community land.

The park is well used for sporting activities and has facilities and a clubhouse with plantings providing visual amenity, however there are weeds present near the clubhouse.

The reserve would benefit from additional shade tree planting on the north and western side of the playing field, of understorey and ground cover species on the eastern bank, and to the northeast to create a vegetated linkage.

d) Windradyne

Richardson Street Detention Basin

Lot 46 DP 843032 Operational land.

The large grassed detention basin also provides passive recreational opportunities. Lacking shade trees, there is opportunity to plant trees around the basin edges, where it does not conflict with floodways, and in the drainage land to the north west to enhance the corridor linkage.

Council could investigate options for a constructed wetland within the detention basin. As an example, low flows could be diverted (if possible) and a bioretention/biofiltration system constructed to treat water quality through the use of specifically designed substrates and aquatic plants.

Windradyne Open Space and Carbine Close Open Space also Reservoir No.8

Wright Place, Freestone Place, Nightmarch Parade, Carbine Close, Windraydne; Lot 38 DP 804590, Lot 46 DP 832374, Lot 36 DP 790240 Community land; Lots 45 & 48 DP 832374 Operational land.

The network of parks forms a spine of open space along the ridgeline that protects scenic amenity. The reservoir and open space provide for water storage and overflow as well as passive open space. There are planted trees and mown grass with some weed invasion and lack of habitat for native fauna.

There is scope for additional understorey plantings to create a vegetated habitat linkage as well as retaining open space, playground and reservoir overflow function, whilst removing environmental weeds. Bare ground could be mulched and planted.

e) Robin Hill

Links Open Space

Lot 12 DP 819967 Operational land.

In the upper reaches of Jordan Creek, the grassed reserve provides a drainage function and passive recreation.

Lacking shade trees, there is opportunity to continue revegetation works around the edge of the reserve open space, treat environmental weeds, and continue to not slash around edges to create a vegetated linkage.

f) Kelso

Colonial Circuit Open Space Reserve

Colonial Circuit Kelso Lot 1132 DP 1070204 Community land.

The large grassed open space reserve is well located on the edge of a new and future subdivision and houses a trigonometrical station occupying a high point with expansive views over the Macquarie River floodplain. The reserve is currently undeveloped; a reserve masterplan should be prepared to create a scheme for the reserve incorporating native vegetation, screening of residential fences, preserving the scenic view of the Macquarie River floodplain, and creating connectivity of vegetation and walking / cycling linkages through the future development to the north of the reserve. The reserve should include interpretation of the trigonometrical station and the landform of the floodplain.

Laffing Waters Park

Eltham Drive, Kelso; Lot 7005 DP 1028076 Crown Reserve for Public Recreation 1011909 Council Trustee.

The park is grassed with shaded playground areas.

Alec Lamberton Field

Lee Street, Lot 7 DP 620655 part Operational, part Community land.

The reserve has sporting facilities and is used for active recreation and a backup camping location for Tent City for the Bathurst 1000. It has limited plantings along the northern and southern boundaries.

A scoping study for its future use is proposed to identify the best use options for this site. The study should incorporate a planting scheme of native trees and shrubs.

Bona Vista Park

Kabbera Boulevard, Kelso; Lot 283 DP 245561.

This well treed park is an unusual design consisting of a circular shape with four radial access ways within an existing suburban area.

Bunora Park

Kabbera Boulevarde, Kelso; Lot 57 DP 239443,.

Bunora Park is a small developed park with a playground, grass and planted trees. Some of the shade trees are in decline and should be replaced. Tree density can be increased to provide screening of residential fences. Mowing around eucalypts should cease due to trunk damage, and the area under the tree canopy mulched and revegetated with shrubs and ground covers.

Drainage Reserves - Rosemount Avenue, Ilumba Way, Marsden Lane, Willow Drive, Eltham Drive, Wentworth Drive, Bonnor Street, Collins Close and Boyd Park Reserve

Gilmour Street, Willow Drive, Ilumba Way, Eltham Drive, Wentworth Drive, Bonnor Street, Collins Close, Camidge Close, Patterson Place, Kelso; Lot 120 DP 1003224, Lot 52 DP 1010434, Lot 1019 DP 1042834, Lot 3 DP 708747, Lot 1340 & 1341 DP 1142980, Lot 1825 DP 1146965, Lot 1435 DP, Lot 24 DP 1004043, Lot 1132 DP 1129602 Lot 104 DP 1085343, Lot 275 DP 735655, Lots 33 & 34 DP 593108, Lot 335 DP 259238 Community land; Lot 39 DP 837243 Lot 128 DP 1195774, Lot 92 & 93 DP 817075 Operational land

The network of drainage reserves all flow into Raglan Creek from the east collecting water from the upstream natural watercourses through the urban subdivision. Many feature remnant vegetation and planted habitat linkages.

There is scope to continue the revegetation schemes to create vegetated linkages along drainage corridors and pedestrian pathways to improve habitat, aesthetic values and water quality.

Unnamed Reserve Wentworth Drive

Wentworth Drive, Kelso; Lots 319 & 320 DP 1205931 Operational land

The large and well situated reserve is currently undeveloped in a new subdivision and consists of mown grass and a drainage line. A plan for the reserve should provide open space and vegetation linkages along the drainage line.

Unnamed Reserves Eltham, Coates, Keane, Graham

Mendel Drive, Coates Drive, Keane Drive Kelso; Lot 544 DP 1219505 Operational land, Lots 345-347 DP 1196600, Lot 634 DP 1213561 Community land.

Five small undeveloped reserves amongst the new subdivision require master planning to provide open space, drainage function, vegetation linkages and public access.

g) Raglan

Elmo Lavis Park

Napoleon Street, Raglan; Lot 189 DP 46450 Crown reserve 96860 for public recreation.

Providing a thermal buffer on the western side of Raglan, the reserve features groups of planted native trees and a loop pathway.

There is potential for increased planting of native understorey shrubs and groundcovers to create improved native fauna habitat and a vegetated link.

Napoleon Street and Christie Streets Drainage Reserves and Adrienne Street Open Space

Napoleon Street, Adrienne Street Raglan; Lots 2&3 DP 776910, Lot 806 DP 806168, Lot 221 DP 830125, Operational land, Lot 217 DP 776787 Community land.

Christie Street Drainage Reserve flows into Napoleon Street Drainage Reserve and thence into Raglan Creek; they also provide green space on the western side of Raglan. The drainage line is an open channel with weeds, and occasional native plantings of shrubs and trees on banks.

The opportunity exists to undertake weed control in the channel and restore the riparian zone through revegetation to create a vegetated link along Raglan Creek.

Napoleon Street Reserve

Napoleon Street, Lot 42 DP 607903, Community Land.

The reserve comprises planted native trees and mown grass on the western side of Raglan and functions as a visual buffer between the suburban and industrial lands. Several mown pathways exist within the reserve.

Opportunity exists for the planting of understorey of native shrubs and ground covers to connect the trees, and to enhance amenity and habitat value within the reserve.

Frome Street Park & Ralph Cameron Oval & Playground

Locke St and Frome St Lots 1-11 DP 758864, Lot 1 DP 4276, Lot 1 DP 667874 Community land.

Frome Street Park has native plantings of trees, shrubs, understorey and ground covers on the western boundary of the open space adjoining the tennis courts, community hall and playground. Ralph Cameron Oval has cricket nets, new water tanks, and features larger trees on the southern boundary, with sparser plantings on the eastern boundary and a row of planted native trees on the northern boundary.

There is scope to expand the native planting on the western side of Frome Street Park, to undertake screen planting to buffer the residential fence on the north side, and to expand the planting around the community hall. There is opportunity for screen planting around the water tanks, to increase the planting densities on the eastern side, and to provide a second row of trees on the northern side of the oval.

Old Raglan School Surrounds and Raglan Fire Station

Nile Street and Christie Street, Lot 1 DP 44100, Lots 10, 15, 2 & 23 DP 758864, Lots 192&193 DP 821845, Crown Reserve 190079 for Public Recreation, Council reserve trustee.

The Old Raglan School grounds is a small Crown reserve with the Raglan Fire Station in the south west corner. The reserve provides visual amenity around the old school and has a significant number of mature and ageing trees. It includes exotic Monterey Pine, English Oak, Elm, Cypress and native Kurrajongs, Casuarinas and Yellow Box.

There is potential to increase planting around boundaries of the northern lots.

Locke Street Open Space

47 Locke Street; Lot 701 DP 1023996 Crown Reserve 41402 for Public Recreation.

This is an underutilised open area of cleared land vegetated by grass. Opportunities for improved usage of the Crown land should be examined.

h) Perthville

Brian Booth Recreation Reserve

Seldon Street, Lot 7003 DP 1028774 Crown Reserve (R46347) Council Reserve Trustee.

Brian Booth Reserve provides sporting facilities for a range of active sports including cricket, pony club and potentially athletics with the Perthville School. The reserve is dominated by large grass areas with few shade trees.

Planting of shade trees in strategic locations around the boundary should occur. Species selection should include preferred koala food trees. Riparian restoration and revegetation and an informal access pathway along the creek are also recommended.

i) White Rock

White Rock Macquarie River Access Way

White Rock Road, Lot 1 on DP 1155183, Operational Land.

A narrow access reserve at the end of White Rock Road provides access to the Macquarie River and should be retained to allow for public and Council access. The reserve was revegetated with a range of Box-Gum Woodland species in 2009/10, with the aim of connecting the roadside remnant vegetation with the riparian vegetation of the Macquarie River.

j) Sofala

Sofala Showgrounds

Sofala Rd, Lot 1 DP 758908 Crown Reserve 91528 Public Recreation - Sofala Showground, Council Reserve Trustee.

The Sofala Showground provides for active recreation and visual amenity and is the venue for the Sofala and District Agriculture and Horticulture Show. The showground vegetation is in good condition with plantings of native trees lining the entry road and around the boundaries of the showground arenas, and some exotic plantings to the north. There is Box-Gum Woodland in the south western part of the property. The park is in good condition; however there have been some instances of vandalism.

Ongoing tree maintenance and replacement should occur, along with restoration of areas that are bare, eroded or invaded by weeds.

k) Wattle Flat

Wattle Flat Recreation Ground

Brae Lane, Lot 19 DP 755803, Crown Reserve R5086 for Public Recreation, Council Reserve Trust manager.

Brae Lane and a private access road traverse the reserve, which is used for active open space. Believed to be used for cricket and football since the 1890s, the reserve has a number of remnant native and planted trees surrounding the active areas. The recreation ground has a low aesthetic quality and low level of maintenance apart from mowing.

Some trees may contain hollows and should be retained. Should there be safety concerns, only the dead wood should be removed or if the trees require removal they should be retained as habitat stumps. If the reserve usage warrants, an upgrade of facilities should include a native planting scheme.

l) Trunkey Creek

Trunkey Creek Recreation Reserve

Lloyd Street, Arthur Street, Lot 7310 DP 1142395 Crown Reserve R590131 for Public Recreation, Council Reserve Trustee; Lots 1 & 2 DP 758998 Operational Land.

Trunkey Creek Recreation Reserve has sporting and camping facilities and is well utilised by campers and for sports, especially by the local Trunkey Creek Public School. Weed trees occur on the western boundary of the operational land. The eastern part of the Crown land is remnant native vegetation and is addressed in Chapter 7.

There is potential to enhance the reserve's vegetation by replacing weed trees and increasing the planting of native trees for shade and amenity, together with possible upgrades to facilities.

10.3.5 Ancillary land – Community Halls and Rural Fire Brigades

Council manages a number or properties that house Community Halls or Rural Fire Brigades and other land where there are issues for consideration under the VMP.

a) Community Halls and Fire Brigades

Council lands include the Community Hall at Perthville, and Rural Fire Brigade properties at Peel, Sallys Flat, Raglan, Georges Plains, Wattle Flat, Fitzgerald Valley, Bruinbun, Eglinton, Sunny Corner and Yetholme. A number were surveyed, and the main issue identified was the lack of tree planting on the properties, except for the Peel Rural Fire Brigade. All of the properties would be enhanced by supplementary planting to provide shade and cooling for volunteers and residents. Sallys Flat contained remnant Box-Gum Woodland that is to be retained and would benefit from a small project of weed control, cessation of grazing, and riparian restoration along Ryans Creek through

fencing, ceasing mowing and revegetation with locally endemic vegetation.

10.4 PARKS AND PUBLIC RESERVE MANAGEMENT

10.4.1 Guiding Principles

The future direction of vegetation management for the parks and public reserves of the Bathurst Regional LGA are guided by a number of specific principles. These are:

- Develop themes and management recommendations that reflect the character of the immediate natural and built environment;
- Recognise existing heritage values of public parks and reserves;
- Vegetation management to allow for future development within open space areas, in context with the character and value of the area;
- Enhance and preserve significant values of open space areas preserved for their heritage and aesthetic values;
- When planning parks and park upgrades consider principles of CPTED to create and maintain safe environments;
- When acquiring new parks and reserves, only accept dedication of land that has open space values and is of an appropriate size, shape and location to provide for efficient management and for community benefit;
- Consider opportunities to enhance park values, conserve water and improve water quality by constructing stormwater treatment and reuse schemes and sewer mining schemes;
- When vegetating new development areas fire management needs to be considered as well as the requirements of native fauna;
- In planting new subdivisions, the ongoing maintenance requirements of plantings needs to be considered; and
- Species for planting may need to be adjusted for climate change.

10.4.2 Management Strategies

Table 11 Parks and Public Reserves Strategies	
Strategies	**Recommendations**
OBJECTIVE 1: To retain and conserve the heritage value of Machattie Park while accommodating future memorial features and plantings	
P1. Management of Machattie Park to reflect existing and future management guidelines.	• Review management strategies in the *Interim Conservation Management Strategy* for Machattie Park and other Council related plans (e.g. Council's Management Plan for Machattie Park (Gutteridge, Haskins and Davey 1990) and Bathurst Heritage Study (Hughes *et al* 1990).
P2. Manage the Park to maintain its inherent qualities.	• The Park to remain as a general community park and as a focal point for community leisure time activities; • At some time in the future other memorials could and should be added to the Park to continue its historic role in commemorating members of the community; • Plantings in garden beds can be changed as required, avoiding modern cultivars and plant species; • Seek funding through NSW Heritage Council and other organisations for proposed improvements or upgrading; • Maintain the Begonia house to a high standard to ensure continued visitations; and • Appropriately replant trees in consideration of heritage and design values, as a process to sustaining the park when older trees begin to senesce.
OBJECTIVE 2: To retain and conserve the heritage value of Kings Parade while accommodating future memorial features and plantings	

Table 11 Parks and Public Reserves Strategies	
Strategies	**Recommendations**
P3. Management of Kings Parade to reflect existing and future management guidelines.	• Review management strategies in the *Interim Conservation Management Strategy* for Kings Parade and other Council related plans (e.g. Bathurst Heritage Study (Hughes *et al* 1990) and Central Pilot Program State Heritage Register (2001), Heritage Office; • Kings Parade to remain as a general community park and as a focal point for Community parades, celebrations and remembrance services; and • Plantings in garden beds can be changed as required, avoiding modern cultivars and plant species.
OBJECTIVE 3: To Improve the visual amenity and functionality of key parks and reserves	
P4. Design and redevelop Centennial Park to improve its overall amenity value.	• A scoping study for Centennial Park has been undertaken to consider options for the future use of the park. Future use and design should generally consider the following: – Retain as an open space area for passive recreation and the possibility of active recreational usage; – A suggestion could be to centrally locate a significant water feature as a focal point to add interest to the park; – The layout of paths is to use good design and CPTED principles. The existing path bisects the park and has no visual appeal. Consider symmetrical formal layout; – Design of the park to be consistent with the heritage theme of the HCA, the outcome of the Centennial Park scoping study report and the Council adopted preferred option; – Irrigation, especially at the time of plant establishment is essential. On-going provision for irrigation to be considered. Consider treatment and reuse of stormwater in the park through raingardens etc; – Tree species to be predominately exotics, with consideration given to their origin. Avoid plants reliant on good soils and high moisture requirements that have originated in moist, fertile regions; – Native trees can be used, though they are to work in with a heritage/formal landscape design; and – Landscape material to be appropriate (i.e. crushed granite as opposed to more ‘earthy’ materials).

Table 11 Parks and Public Reserves Strategies	
Strategies	**Recommendations**
P5. Design and redevelop Victoria Park to improve its overall amenity value.	• Retain as an open space area for passive and active recreation and playground facilities; • Continue to implement Stage 2 of the Adventure Playground Design; • Future park design layout of paths to use good design and CPTED principles; • Consider terracing areas to achieve some flat terrain, whilst avoiding dramatic root disturbance to existing trees; • Design of the park is to be consistent with the heritage theme of the HCA; • Irrigation, especially at the time of plant establishment is essential. On-going provision for irrigation to be considered. Consider treatment and reuse of stormwater in the park through raingardens etc; • Tree species to be predominately exotics, with consideration given to their origin. Avoid plants reliant on good soils and high moisture requirements that have originated in moist, fertile regions. Consider plants less likely to be affected by higher temperatures and drier weather for climate change resilience; • Native trees can be used, though they are to work in with a heritage landscape design; and • Landscape material to be appropriate (i.e. crushed granite as opposed to more 'earthy' materials suitable).
P6. Develop and implement a park Masterplan for Colonial Circuit Open Space Reserve, Kelso.	• Develop a masterplan for Colonial Circuit Open Space Reserve that: – Incorporates the use of native vegetation; – Improves the aesthetic value by screen planting of residential fences; – Preserving the scenic view of the Macquarie River floodplain through planting trees in groups to retain vistas; – Provides for connectivity of vegetation and access linkages through the future development to the north of the reserve; and – Includes interpretation of the Trig. Station and the landform of the floodplain.

Table 11 Parks and Public Reserves Strategies	
Strategies	**Recommendations**
P7. Perthville Tennis Courts – redevelopment as town square.	• Tennis Courts property is part of a current scoping study by Council to redevelop the site as a town square, and may include facilities such as BBQs, open space, war memorial, public toilets etc; • Plant koala food and shade habitat trees, as koalas have been recorded in the area; • Plant additional natives near the tennis courts; and • Investigate and remediate localised tree decline and death along the north-western boundary planting.
OBJECTIVE 4: To create a regional riparian recreational zone along the Macquarie River	
P8. Undertake the development of a recreational link along the Macquarie River.	• Implement the Bathurst Regional Community Access and Cycling Plan 2011 links along the Macquarie River that relate to Council managed parks and gardens including along Okuma Garden and Kefford Nursery Open Space; • Areas outside Evans and Hereford Street Bridge to have a maintenance level more akin to a natural parkland; • Retain the Kefford Street Open Space site for future community recreation purposes; • Upper-storey vegetation to be endemic native species; and • Riparian zone to be restored according to best management practices.
OBJECTIVE 5: To create a local recreational and vegetation linkages along riparian parks and drainage reserves	
P9. Undertake the development of a vegetated and recreational link along Queen Charlottes Vale Creek, Perthville.	• Undertake a vegetated and recreational link along Queen Charlottes Vale Creek including Brian Booth Reserve, Bridge Street Park and connecting parkland land to the north and south; • Riparian zone to be restored according to best management practices and to incorporate weed removal and revegetation with native riparian species including locally indigenous trees, understorey, shrubs, sedges, reeds and ground covers as appropriate for site conditions; • Incorporate additional tree planting within the parks to provide shade for park users including residents and visitors and cricket clubs, pony club and Perthville School;

Table 11 Parks and Public Reserves Strategies	
Strategies	**Recommendations**
	• Include preferred koala food tree species in the planting scheme; and • Incorporate park upgrades and strategically located informal walking tracks and facilities.
P10. Continue the development of vegetated and recreational linkages along local riparian parklands and drainage reserves.	• Continue local projects to create vegetated and public access linkages along local waterways to improve habitat and aesthetic values and water quality; • Utilise endemic species of trees, understorey, shrubs and groundcovers as appropriate; • Allow for informal public access linkages; and • Where beneficial, include treatments to improve environmental quality, such as chain of ponds wetlands, or biofiltration systems.
P11. Investigate and develop programs for parkland water quality improvement and reuse to improve environmental quality of parks and receiving waters.	• Investigate and develop programs for water quality treatment and reuse in key parks to improve the condition of park grounds, minimise costs and provide improved water quality for downstream receiving waters; and • This may include raingardens, constructed wetlands and biofiltration systems.
OBJECTIVE 6: To improve the visual amenity and functionality of parks and reserves through practical planting principles	
P12. Adopt planting principles to improve the amenity and environmental values of parks and reserves.	• Plan parks to protect scenic ridgelines, corridors and riparian zones through planting, buffer planting to screen from adjoining land uses, incorporating habitat values and climate change considerations into plant selection and layout, as a fundamental component of open space planning, layout and design; • Plant trees and shrubs in groups rather than as widely scattered individuals. The groupings can be mulched and kept weed free to reduce slashing; • CPTED principles should be considered when landscaping and avoid creating visual barriers where they are not appropriate for personal protection; • Plant evergreen trees where practical to form windbreaks on the south and south-west of sporting fields, playgrounds etc. (suitable species include Conifers, She-oaks, and other Australian natives); • Plant deciduous trees near amenities, and to the north and north-east of sporting fields, playgrounds etc.;

Table 11 Parks and Public Reserves Strategies	
Strategies	**Recommendations**
	• Shade trees to be planted on the north and west of sporting fields, playgrounds etc.; and • Avoid eucalypts where cars are likely to park.
P13. Strategically increase tree planting in parks and public reserves.	• Replace dead or diseased trees, either in place of origin or at different locations (site dependent); • Replanting program to concentrate on one park/reserve at a time to avoid spreading resources thinly; • Target parks and reserves with high or potentially high amenity value and new subdivision areas where natural landscapes are devoid; and • Increase tree cover along unshaded footpaths and cycleways within parks and reserves. Avoid planting shrubs immediately adjacent to cycleways to prevent branches causing injuries and to lessen the security risk.
P14. Strategically increase tree planting in parks and reserves within the villages and rural areas.	• Target parks in rural village areas that provide a community focal point; • Prioritise key projects such as sportsgrounds, recreation reserves and other parks with a high level of community usage or value; and • Facilitate tree planting at Community Halls and Rural Fire Service Brigades to provide shade and thermal buffer, whilst retaining and restoring any remnant trees or vegetation on the properties.
OBJECTIVE 7: To change management or decommission parks and reserves as compensation for improving parks and reserves of high or potentially high amenity value	
P15. Adopt strategies within the Bathurst 2040 Open Space Strategy.	• Refer Bathurst 2040 Open Space Study.
P16. Dispose of land of low open space or conservation value.	• Land of low open space or conservation value should be evaluated for rationalisation through survey of boundaries and options for the potential sale or lease to the adjoining land owners considered.
P17. Reduce resource input into key parks and reserves.	*Parks with low usage and values* • Develop a land dedication policy that defines land that is acceptable to Council for dedication as part of a

Table 11 Parks and Public Reserves Strategies	
Strategies	**Recommendations**
	development or subdivision, to prevent poor quality parkland being transferred to Council and resources being poorly used on unsuitable land. It may include that: – Land with open space or conservation values to be dedicated where this is at no cost, is in a size, shape and condition that will minimise ongoing management costs. – A legal agreement (such as a planning agreement prepared under the EP&A Act) be entered into to establish a mechanism to maintain values and to accept dedication of land to Council; • In the short-term, implement management practices to reduce misuse of land; and • Plan for long-term land use that better utilises open space, or if not on the whole the land is not of community benefit dispose of the land to redirect resources into priority reserves. *Parks near drainage networks* • Plan where possible to use urban stormwater for park irrigation following water quality treatment. *Park upgrades* • Maintain upgraded parks using best practice techniques, to ensure cost effective management and to extend the life of the upgrade, delaying the need for future upgrades. *Parks/Reserves with remnant vegetation* • In areas where groundcover has a high proportion of native grasses or where regeneration of Box-Gum Woodlands or native vegetation communities are likely, reduce slashing incidence, restrict slashing area or do not slash at all. Native grasses have a low fire hazard due to their relatively low bulk. If it needs to be slashed it should be undertaken post flowering; • Undertake timely weed control of priority weeds targeting weeds whilst infestations are small and manageable, preferably before weeds set seed, of small areas in a staged manner to minimise soil erosion, prioritising resilient vegetation and utilising sound bush regeneration principles; and • Ensure park use (such as camping) does not damage the remnant vegetation or environmental values.

Table 11 Parks and Public Reserves Strategies	
Strategies	**Recommendations**
OBJECTIVE 8: To produce quality park landscapes, to avoid stress induced disease and to improve the amenity of the area through judicious species selection	
P18. Select plant species suitable for the specific growing conditions of the designated area.	• Refer to Appendix D Species Lists; • Consider the height, width, and structural characteristics to suit constraints of location (land function, views, power lines, visual obstructions such as near traffic lights and street lamps, plant structural soundness); • In the HCAs, open space areas such as informal public reserves and sporting fields can include native species where soil and moisture limitations would not favour good health and development of exotic species; and • Open space areas surrounding historical buildings need to be influenced by original plantings and their design setting.
P19. Enhance the tree's visual appearance, keep services, infrastructure and views unobstructed and ensure the structural soundness of the trees.	• New trees to be protected with tree guards or stakes to promote healthy growth form; and • New and existing trees to be directionally pruned, where necessary, particularly in the early stages of growth and thereafter periodically assessed/pruned by a qualified arboriculturist to ensure their continued health and desired form.
P203. Enhance the visual appearance of the park or reserve.	• Select trees according to the scale of the area, theme, surrounding characteristics of the natural and built environment; and • Group or linear plantings are more unified than widely scattered, unconnected trees.
OBJECTIVE 9: Parks and reserves in the village of Raglan to accommodate for the aerodrome clearance requirements	
P21. The Raglan Sports Complex vegetation to accommodate for aerodrome clearance requirements.	• Trees to be less than 15m in the north-eastern portion and 20-30m on the south-western portion.

10.4.3 Actions

Table 12 Parks and Public Reserves Actions		
Action	**Strategy Identifier**	**Importance Ranking (1-highest, 4-lowest)**
Centennial Park redevelopment.	P4	3
Victoria Park redevelopment.	P5	3
Colonial Circuit development.	P6	2
Perthville Town Square (vegetation).	P7	2
Develop recreational access link along the Macquarie River.	P8	1
Vegetated link along Queen Charlotte Vale Creek Perthville.	P9	3
Increase tree planting in parks and reserves in Bathurst City.	P13	1
Increase tree planting in villages and rural parks.	P14	1
Adopt strategies given in the Open Space 2040 Study.	P15	3
Decommission public reserves of low value.	P16	4
Change management practices in parks and reserves.	P17	2

11 GATEWAYS

11.1 VISION

The approaches into Bathurst Regional LGA from rural surrounds encompass the main entrances to the City as well as the entrances to the villages.

City entrances need to reflect the identity of Bathurst and the surrounding heritage and natural environment whilst providing a strong entrance statement to a progressive city.

Village entrances reflect a sense of arrival to a community settlement, often of heritage significance.

11.2 INTRODUCTION

For the purpose of this report gateways are considered to be the major highways and roads leading into Bathurst City and villages in rural settings.

Parts of the highways and roads within the City are addressed as main access ways and as such are covered in the vegetation themes and streetscape sections of the report. Gateway treatments into Eglinton, and from O'Connell and Peel into Bathurst are also addressed in the vegetation themes and streetscape sections of the report (Refer Sections 5 & 10).

Village entrances are addressed in this section.

MAP REFERENCES

Map A - Vegetation Themes

Map B - Significant Vegetation and Natural Landscapes

Map E - Site Specific Project

11.3 BACKGROUND

11.3.1 Values

The gateways into Bathurst City and the villages are recognised as being important features as they represent (Moses 1995, Australian Tree Consultants 2007, Bathurst Regional Council Village Plans, 2015):

- A sense of arrival to Bathurst City from the countryside;
- The first impression of Bathurst City's character;
- The beginning of the transition between a rural environment and the Bathurst urban environment;
- Arrival in a village, often historic and an important community focal point; and
- A transition from the rural environment and remnant vegetation to a village settlement.

It has been reported (Moses 1995) that Bathurst has a distinctly rural identity, characterised by the surrounding rural landscape, the rural backdrop of the City when viewed from many of the streets, the valley setting, floodplain and the visible ranges on the eastern horizon. The gateways need to reflect this identity.

Likewise, the villages have their own rural identity with strong historic and heritage values and a centre for highly valued community facilities (Bathurst Regional Council Village Plans, 2015).

11.3.2 Issues and Threats

a) Bathurst City

A number of issues and threats are recognised that relate to the gateways into Bathurst City, principally from the approaches along the Great Western Highway to the east and the Mitchell Highway to the west. These are the most prominent entrances to Bathurst and assume the greatest significance.

The issues and threats are listed below:

- Inappropriate species selection, especially under power lines;
- Lack of unity;
- Lack of trees or gaps in avenue;
- Weeds;
- Lack of visual impact;
- Lack of planning, continuity and landscaping;

- Lack of screening to residential or industrial areas;
- The death or decline of existing trees;
- Inadequate tree management, pre and post planting;
- Tree stress or damage due to routine operation of utility services (e.g. pruning under power lines) and mechanical injury to roots, trunks or branches (e.g. induced through road works);
- Suckering of Poplars; and
- Tree height of Poplars in vicinity of the aerodrome.

b) Villages

A number of issues and threats are recognised that relate to the gateways into villages.

A list of the issues and threats are below:

- Narrow width of road reserves;
- Location of overhead power lines and conflict with trees;
- Topography of the land;
- Lack of unity;
- Lack of trees or gaps in avenues;
- Weeds;
- Lack of visual impact;
- Lack of planning, continuity and landscaping;
- The death or decline of existing trees;
- Inadequate tree management, pre and post planting;
- Tree stress or damage due to routine operation of utility services (e.g. pruning under power lines) and mechanical injury to roots, trunks or branches (e.g. induced through road works); and
- Suckering of Poplars.

11.3.3 Existing Situation

a) Great Western Highway (Eastern Approach)

The approach from the eastern LGA boundary to the CBD passes through distinct sections, arbitrarily demarcated by land use and biophysical, functional and visual characteristics. Gateway recommendations and 'theme' treatments are specific to each section and are described accordingly.

Brief descriptions of the sections as they currently exist are given below.

Section between Glanmire to Raglan

This road section extends from Glanmire to Raglan and is predominately a rural setting situated on the generally treeless 'Bathurst Plains'.

Existing roadside vegetation consists of exotic grasses, widely dispersed small isolated clumps of immature Silver Wattle and Hawthorn.

Section at Raglan Village

This section extends from the eastern boundary of Raglan to Elmo Lavis Park

The main feature of this section is it offers the first views to the City, and because of the relative elevation the views are significant.

The highway is flanked on the southern side by the village of Raglan and the open landscape of the Aerodrome on the northern side.

The major constraint to vegetation planning in this area is the restrictions by the Civil Aviation Safety Authority (CASA) for obstruction limitations. The maximum allowable height for trees in this section has been calculated to be 7 to 14 metres.

Lombardy Poplars form a discontinuous avenue on the northern and southern side, which are at a height that will require management to keep within allowable limits. The width of the road currently does not allow for additional tree planting.

Section from Raglan Village to Ashworth Drive

The descent into the City provides a significant landform feature of this section.

The predominant highway vegetation flanking the Great Western Highway is Lombardy Poplars planted in a discontinuous avenue formation. These feature trees provide a significant entrance statement into Bathurst because of their linear form and line of direction.

Section from Ashworth Drive to the Kelso Floodplain

This section is essentially the built up area of Kelso and accommodates power lines, existing street trees, traffic lights at intersections, and commercial and residential premises.

The visual amenity has been improved by the Highway upgrade in 2017 which included additional tree planting and mass planted garden beds.

Section includes the Kelso Floodplain

This section comprises public open spaces and sporting fields on the northern side, and commercial premises and rural lands on the southern side.

On the northern side there is already in existence exotic and native trees along the highway forming a discontinuous line. The avenue includes more than one species and the planting is of variable spacings, both between trees and distance from the highway. The southern side is devoid of mature trees with new plantings of Pin Oaks being the only trees within the road reserve.

The open space on the northern side of the highway is expansive and accommodates an access path between Bathurst City and Kelso, unlike the southern side, which is bounded by private land zoned market garden.

The Carillon, Mount Panorama and the historic architecture of Saint Stanislaus College can be viewed from this section of the highway. The Carillon becomes the focal point along the highway when viewed from the eastern perspective and Mount Panorama and St Stanislaus College provide interest in the background.

During floods the Kelso floodplain is periodically inundated with floodwaters and drainage problems can occur.

Section includes Kendall Avenue

As the traveller enters Bathurst there is a transition between the rural, commercial and industrial, and urban environments with outlying rural areas and the floodplain being viewed along the highway. This section of the highway along Kendall Avenue signifies the gateway into the central part of historic Bathurst. It is flanked by mature Elm trees and significant heritage buildings such as the showground and residential cottages beyond Alan Morse Park. The Elm trees fronting the showground have high heritage value.

Delineating Alan Morse Park and the highway are avenues of trees and raised beds interplanted with ‘Mop Top’ Robinias.

Alan Morse Park is used as a cricket and athletics venue, a rest stop for travellers and car park facility in events such as the Royal Bathurst Show. It has an Information Centre to the north-west corner of the park.

b) Mitchell Highway (Western Approach)

The Mitchell Highway approaching Bathurst at first passes through rural residential land, undeveloped rural land and new residential estates. The view of the urban backyards is clearly visible from the highway.

The character of the surrounding built and natural landscape changes along the highway as land use accommodates for service businesses, drainage reserves, a cemetery, golf club, sporting facilities, goal and passive recreational park, and finally the older dwellings of Bathurst City.

The streetscape along this section of highway is disjunct with remnant vegetation on the western most approach, and planted exotics closer to the City.

A landscape entrance statement was constructed in 2015 at the intersection of Bradwardine Road and the Mitchell Highway, including a brick and bluestone wall, signage, lighting, irrigated mass plantings of ground covers, and exotic tree species including Maples, Pin Oaks, and Blue Cedars.

An avenue of Autumn Blaze Maple (*Acer freemanii*) and Ornamental Pistachio (*Pistachio chinensis*) was also planted from Richardson Street to the Hector Park information bay. From a historical perspective, the section of Highway from the cemetery to Stewart Street incorporates Memorial Drive which was planted with an avenue of 460 wattles to commemorate the soldiers in the First World War. The wattles and their protective tree guards of three posts and netting have long gone. The plantings declined due to the short-lived nature of the

wattles, but also replanting may have been difficult due to the pressures of the Depression era.

The avenue currently exists of a discontinuous line of Deodar Cedars (*Cedrus deodara)* of varying stature. Those not restricted under power lines are mostly healthy and have attained good growth and habit. Those pruned under power lines (alongside the golf course) are disfigured, with some showing signs of dieback. Gaps in the avenue are common throughout the avenue.

Other trees in the avenue include Lombardy Poplars, Radiata Pine and Eucalypts.

c) Mid-Western Highway

The road reserve along the Mid-Western Highway retains or is flanked by remnant Box-Gum Woodland in a 'rural, semi-rural' setting, typifying the character of the gateway.

A landscape entrance statement was constructed in 2015 at the intersection of McDiarmid Street and includes similar structure and plantings to that on the Mitchell Highway.

An avenue of ornamental cultivated Poplars and Ornamental Pistachio (*Pistachios chinensis*) were also planted from the 100km sign to the intersection of Browning Street.

There are native plantings on road cuttings near new subdivisions at Robin Hill reflecting the remnant vegetation in the area.

Weeds, particularly in the drainage lines, and the discontinuous nature of the remnants in the road reserve are the key issues.

d) Vale Road

The road from Perthville to Bathurst City runs along the Macquarie River floodplain, set in a landscape of market gardens, treeless plains and Willow fringed creek and river systems. The setting is distinctly European and lends itself to species requiring more fertile soils and water availability.

The existing plantings are exotic with native vegetation being absent. The avenues of trees include a number of exotic deciduous species of varying forms and heights. Their health status is also variable, with many trees showing severe signs of dieback, aging, and attack from Elm Leaf Beetle. The avenue is also discontinuous with gaps being prevalent throughout.

The gateway plantings especially the Elms and Poplar have had dangerous trees removed following the Heritage Street Tree Survey (Australian Tree Consultants, 2007). The road upgrade proposed by Roads and Maritime Services (RMS) includes 1.7 kilometres from the railway crossing in Perthville to 750 metres east of Hen and Chicken Lane. It includes the Elm trees on the approach to Perthville. Due to community concern for the trees the project has been designed to avoid impacts to the tunnel of Elm trees, except for three trees within the tunnel to enable the road widening. A further three trees would need to be removed outside the tunnel (RMS, 2018).

Ongoing tree maintenance, pruning and thinning will need to occur to align the gateways needs to the increase in vehicular movements and confined planting spaces, and carriageway realignments.

e) Duramana Road and Rankens Bridge Road Eglinton

The southern entrance to Eglinton along Rankens Bridge Road transitions from the Bathurst City via the Macquarie River to the new subdivision. This road has several mature Casuarinas on the western side north of the bridge and several deciduous plantings on the eastern side near the pathway. The northern entrance along Duramana Road transitions from the rural area to the subdivision and consists of cleared land with roadside weeds.

Opportunity exists to create entrances to the subdivision that create a transition from the adjoining Macquarie River to the south and the rural land to the north. These plantings would also enhance visual amenity and provide shade and thermal comfort for the dwellings.

f) Rockley Road, Rockley

On the descent into Rockley Village from the north, the vegetation transitions from discontinuous remnant vegetation, to weedy vegetation and into exotic plantings of Elms, Monterey Pine and Poplars. The village is dominated by Elm plantings, with Poplars that

are suckering and some planted Silver Birch trees. Entry from the south transitions from cleared rural land into weedy vegetation and discontinuous plantings.

Removal of weeds, Poplar suckers and Elms in poor condition is recommended. Planting of roadsides where trees are absent and replacement planting should utilise appropriate heritage tree species and not Elms due to the prevalence of the Elm leaf beetle.

g) Sofala Road, Sofala

The approach to Sofala from the south, after travelling down into the Turon Valley, consists primarily of open cleared land. The intersection of Sofala Road with Hill End Road and the adjoining Joyce Pearce Memorial Park are planted with exotic trees. There is opportunity for planting of an avenue of exotic vegetation as an entry to the heritage village.

h) Hobbys Yards Road and Arthur Street, Trunkey Creek

The northern and southern approaches to Trunkey Creek Village HCA transitions from patches of remnant vegetation and weeds into several exotic plantings of Poplars, Cedars and other deciduous species on the lower eastern side in the village.

Constrained by topography, a narrow road reserve and powerlines on the western side of the road, opportunity to create a village entrance through planting is limited to shrubs or low growing trees on the western side and sparse plantings of small trees on the eastern side.

11.4 GATEWAY MANAGEMENT

11.4.1 Guiding Principles

Developing gateways into Bathurst and outlying villages are guided by a number of specific principles. These are:

- To maintain Bathurst Regional LGA's rural identity and cultural heritage;
- To maintain and frame vistas of the surrounding rural landscape where appropriate;
- To reflect the character of the immediate natural and built environment;
- To allow for the appreciation or enhancement of views, vistas or focal points recognised as being significant natural, cultural or heritage features;
- To act as significant landscape features that aid in the transition between the rural and urban landscapes;
- To provide visually impressive statements into the City and villages;
- The plantings on the floodplains are not to cause a reduction in floodway capacity;
- To be adaptable to the constraints of soils and climate and microclimate features of the particular site;
- To consider appropriate species for planting in a changing climate; and
- To recognise the constraints of services, infrastructure, safety requirements and land use.

11.4.2 Management Strategies

Table 13 Gateway Strategies	
Strategies	**Recommendations**
OBJECTIVE 1: To develop gateway landscape features to compliment the surrounding natural landscape and built environment.	
G1. Maintain the rural and cultural heritage identity of the Bathurst Regional LGA through appropriate planting and landscaping.	• Avoid the development of garden settings along the gateways as they are inappropriate for the scale of the surrounds and would be isolated, unconnected features. Gardens to be within more 'intimate' settings such as central parks; • The planting of small trees, shrubs and ground covers may be required due to narrow spaces following infrastructure upgrades, however their design is to reflect the gateway theme as opposed to a garden planting; • For approaches to the City, the gateway vegetation, rural vistas, historical built environment, Carillon, Mount Panorama, floodplains and surrounding vegetation to provide the key focal points; and • For approaches to the Villages, the gateway vegetation, rural vistas, historical built environment, and surrounding vegetation are to provide the key focal points.
OBJECTIVE 2: To manage gateway plantings for long-term visual appeal, desired form, and good health.	
G2. Future roadside plantings are to be assisted in establishment with adequate pre and post planting management.	• Selection of new trees to align the gateways needs careful consideration given the increase in vehicular movements and confined planting spaces, line of sight, and possible future carriageway realignments; • Thorough ground preparation to include hole preparation and weed control; • Supplementary watering, mulching, weeding and fertilising to encourage healthy growth and reduce early stress to the trees; • Protect young trees with stakes if they are prone to be damaged by cars to ensure good growth form; and

Table 13 Gateway Strategies	
Strategies	**Recommendations**
	• Replace any failed specimens.
G3. Remove severely diseased or dying trees at the point where their aesthetic value is decreasing, and their management costs and hazard ranking are increasing.	• Recommendations as per Section 9 (Streetscapes) Strategy S15.
G4. Undertake periodic tree health surveys of gateway trees and develop an inventory database.	• Recommendations as per Section 9 (Streetscapes) Strategy S16.
G5. Adopt drought and climate change management strategies to counteract the adverse effects of extended dry periods on street trees.	• Recommendations as per Section 9 (Streetscapes) Strategy S17.
G6. Adopt appropriate arboricultural principles in the endeavour to extend the life-span of the tree, maintain street trees in good health, desired form and with high aesthetic value.	• Directionally prune trees when they are young to enhance their visual appearance, maintain uniformity of the tree line or avenue, keep services, infrastructure and views unobstructed and ensure the structural soundness of the trees; and • Undertake proper arboricultural techniques to lessen the risk of induced disease and add value to the vegetation.
OBJECTIVE 4: To create a significant eastern gateway (Great Western Highway) into Bathurst that enhances the rural vistas, provides unity amongst many discordant visual effects and reflects the heritage values of the City.	
Section from the Glanmire to Raglan	
G7. The road reserve to be in keeping with the	• Road reserve to be retained as a grassy verge with scattered Silver Wattle being allowed to colonise

Table 13 Gateway Strategies	
Strategies	**Recommendations**
character of the surrounding grassy 'Bathurst Plains' and extending the views of the traveller to a wide area around Bathurst.	where it is occurring naturally. • Remove non-native shrubs such as Hawthorns along road reserve.
Section includes Raglan Village	
G8. Maintain the existing line of Poplars on the airport side of highway to within allowable heights in accordance with CASA requirements.	• Slash all Poplar suckers, avoiding further root damage, which can induce further suckering.
G9. Liaise with RMS during future highway upgrades to ensure their landscape design includes an avenue of trees along the airport side of Raglan Village to mirror the plantings on the other side of the Highway.	• Gateway plantings to accommodate for the constraints set out by the CASA. For the purpose of species selection, the maximum allowable height of the tree at maturity is not to exceed 8 metres; • Single row of exotic trees in an avenue is recommended; • Due to the small scale of the tree in relation to the open expanse of the rural landscape surrounding the Aerodrome, the spacings between the trees to be relatively narrow; • With overly wide spacings the tree avenue will lose its impact and continuity; and • Consider land acquisition if necessary.
Section from Raglan to Ashworth Drive	
G10. Liaise with RMS during highway upgrade to ensure that their landscape design includes treescape highway section to improve visual appearance.	• Maintain current Poplars along road reserve where they will not interfere with overhead power lines and drainage lines. Slash all poplar suckers, avoiding further root damage which can induce further suckering; • Remove exotic trees, shrubs and weed species in the avenue of Poplars; • Allowances need to be made on the southern side for infrastructure constraints and drainage lines

Table 13 Gateway Strategies	
Strategies	**Recommendations**
	adjacent to the Highway. Do not plant Poplars or any other trees in these areas; • Remove Poplar suckers as they appear; • Avoid damaging poplar roots which can induce root suckering; and • The width of the road currently does not allow for additional tree planting. Consider land acquisition to allow for street trees to be continued to the Gold Panner Motel.
Section from Ashworth Drive to the Kelso Floodplain	
G11. Improve the visual amenity of the highway section at Kelso.	• Maintain and replace failed tree and landscape plantings from Highway upgrade; and • Trees to be directionally pruned in the early stages of growth to ensure their form and functionality, especially under power lines.
Section includes Kelso Floodplain	
G12. Develop avenue of trees along floodplain recognising soil constraints, flood regimes and visual amenity.	• Undertake a flood impact assessment to determine if an avenue of trees can be planted without a significant impact. If approved: – Species to be adaptable to soils prone to waterlogging, and cracking during dry periods; – Trees to be single trunked and adaptable to canopy lifting to allow for free passage of water and debris in times of flood; – Plant spacings on the southern side to be wide enough not to obstruct views to Mount Panorama; – Plant and replace Pin Oaks on southern side of highway. Extend from Evans Bridge to Car Stop shop; – To replicate the existing rhythm, species on the right hand side be restricted English Oaks

Table 13 Gateway Strategies	
Strategies	**Recommendations**
	and Maple Leafed Plane Trees. Species to have essentially the same dome shape, be large and have dark brown bark. Avoid light coloured trunks (Birch), cone-shaped trees (Liquidambar) and English and Golden Elms due to Elm leaf beetle attack; – Avenue to be at least double rowed; and – Continue log car barrier to Kelso area.
Section includes Kendall Avenue	
G13. Enhance the visual appearance of the existing vegetation in keeping with its heritage value.	• Remove the 'Mop Top' Robinias; and • Plant gaps in avenue planting with Maple Leaf Plane Trees.
OBJECTIVE 5: To create a significant western gateway (Mitchell Highway) into Bathurst that enhances the rural vistas, screens urban development and reflects the heritage values of the City.	
Section from Dunkeld Road to Sawpit Creek	
G14. Develop the gateway into Bathurst, up to the Sawpit Creek, with a native vegetation theme.	*Riverside (LHS)* • The avenue of trees to be Yellow Box; • Yellow Box need to be appropriately spaced to minimise view obstruction and to maintain vistas to river valley and backdrop of slopes and ranges; and • Remove Hawthorns, African boxthorns, Blackberries, Conifers and exotic trees. *Hillside (RHS)* • Continue to remove any woody weeds such as Hawthorn and Conifers in the road reserve; and

Table 13 Gateway Strategies	
Strategies	**Recommendations**
	• Plant road reserve with frangible native shrub species. Mass plant where possible.
Section from Sawpit Creek to Stewart Street	
G15. Maintain gateway plantings to have a strong visual impact and to reflect the historic identity of Bathurst.	• The theme of the gateway plantings to change to exotic species; • Maintain avenue of *Acer x freemanii* and Chinese pistachio (*Pistacia chinensis)* and replace any failed specimens; • Maintain landscape entrance statement and plantings on the corner of Bradwardine Road and replace any failed specimens; *Windradyne 1100 and Richardson Street Residential Development* • Plant a native tree and shrub screen along the residential development boundary to provide a buffer from the highway. The extent of the screen planting to be extended as development extends; *Bradwardine Road to Stewart Street* • Maintain avenue of deodar cedars (*Cedrus deodara*) up to the Boundary Road intersection only. Do not replace with deodar cedars on the side of the road with powerlines. Where road reserve narrows at intersection with Boundary Road, leave open. Leave the avenue as discontinuous along the cemetery where other established trees exist; • Retain remnant native vegetation and all other existing trees; and • To ensure road signs and the connecting road are not obstructed do not plant Deodars in front of Brooke Moore Oval.
G16. Develop and implement a landscape plan of the area surrounding the visitors information stand at Hector Park to improve the visual appeal and amenity value of the	• Avoid invasive species; • Maintain the chain of ponds wetland; • Utilise only native riparian and aquatic species within Jordan Creek section of the gateway near the

Table 13 Gateway Strategies	
Strategies	**Recommendations**
area.	wetland; and • A mix of native and exotic species would be appropriate for other parts of the gateway.
OBJECTIVE 6: To maintain a gateway into Bathurst from Blayney that complements the natural remnant vegetation in the area and enhances gateways to new subdivisions to transition from the rural and City areas.	
G17 Rehabilitate the road reserve along the Mid-Western Highway from Hen & Chicken Lane to Boundary Road.	• Plant tree species and native shrubs from the Box-Gum Woodland to link to other remnants. • Replacement plantings are to maintain the random group layout, and are not to be in rows or formally laid out; and • Control weeds in the drainage lines where possible together with landholders.
G17. Maintain existing plantings and the "bush atmosphere" fronting Boundary Road Reserve and the Golf Club.	• Maintain existing avenue of *Populus* and Chinese pistachio *(Pistacia chinensis)* and replace any failed specimens; • Maintain landscape entrance statement and plantings on the corner of McDiarmid Street and replace any failed specimens; and • Any ancillary plantings are to be endemic tree species and native shrubs to complement the surrounding bushland and to retain the road reserve as a wildlife corridor and link to other remnants.
OBJECTIVE 7: To create and enhance gateways to new subdivisions to transition from the rural and City areas.	
G18. Undertake a tree planting program along Duramana Road, and Rankens Bridge Road, Eglinton	• Remove weeds from Duramana Road and create a planting scheme to include small trees to be planted to avoid conflict with powerlines on the east and larger shade trees on the west; and • Plantings are to be native and exotic species mix, with natives near the Macquarie River and deciduous exotics near houses for winter solar access (Refer Appendix D, Species List).
G19. Undertake a tree planting program along	• Where entrances to new subdivisions are lacking vegetation, undertake a planting scheme of exotic

Table 13 Gateway Strategies	
Strategies	**Recommendations**
entrances to new subdivisions	and native species mix in clumps; and • Maintain new and existing plantings at entrances to new subdivisions, for example the eastern side of Sofala Rd Kelso, replacing any failed specimens, extending and enhancing plantings where necessary.
OBJECTIVE 8: To create a gateway to Bathurst and Perthville along Vale Road that is European in character and assimilates the unique floodplain landscape.	
G20. Undertake ongoing tree management of existing trees along Vale Road.	As trees grow and senesce, undertake continued management of trees along Vale Road including removal of: • Trees showing severe dieback; • Poplars and Poplar suckers close to the road shoulder; and • Willows, regardless of the species or whether they are non-reproductive males.
G21. Undertake a tree removal and replanting program to continue the avenue planting to the Lagoon village turnoff.	• Remove trees if assessed by a qualified professional or staff as requiring removal; • Suggested planting of a Poplar species (Refer Appendix D, Species List); and • Plantings can continue to Hawthornden Creek.
G22. Maintain Elms into Perthville.	• Undertake sucker control, continue to include within Elm Leaf Beetle control program and continue to prune to accommodate for trucks; and • Do not replace removed trees with Elms due to Elm Leaf Beetle.
OBJECTIVE 9: To create and enhance gateways to Rural Villages in character with the HCAs and Village Plans.	
G23. Undertake a tree removal and replanting program for trees on Rockley Road within	• Remove weeds, Poplar suckers and Elms in poor condition if assessed by a qualified professional or staff as requiring removal.

Table 13 Gateway Strategies	
Strategies	**Recommendations**
Rockley Village HCA.	• Plantings are to be an exotic species reflecting the HCA (Refer Appendix D, Species List); • Plantings are to form an avenue that does not conflict with power lines or utilities and that does not obstruct views of the heritage buildings. Plantings are to undertaken subject to available space within the road reserve and services; and • Do not replace removed trees with elms due to Elm Leaf Beetle.
G24. Undertake tree planting in the entrance to Sofala HCA and in Joyce Pearce Park Sofala	• Create a gateway planting of an avenue of exotic trees in the entrance to Sofala. Plantings to be undertaken subject to adequate space within the road reserve and services; • Remove weeds and Elms in poor condition in Joyce Pearce Memorial Park; • Replace trees removed in the formal part of the Joyce Pearce Memorial Park with exotic species, not with Elms due to Elm leaf beetle (Refer Appendix D, Species List); and • Plantings to be sparse to allow for line of site around the intersection of Sofala Road with Hill End Road at the entry to the village.
G25. Undertake tree planting in the entrance to HCAs and Rural Villages	• Create a gateway planting consisting of exotic species in the entrances to HCAs and Rural Villages, for Wattle Flat, Trunkey Creek, Yetholme, Peel, Sofala, Perthville, Rockley, and Hill End subject to suitable space within the road reserve. • Retain remnant vegetation within the transition from rural land to village settlement; • Remove weeds especially Willows; • Remove trees in poor condition especially those located under power lines; • Plant small tree suitable for narrow road reserves and located near power lines; • Replace senescent Elms with other species, not with Elms due to Elm leaf beetle (Refer Appendix D, Species List); and • Plantings to be sparse to allow for line of site around the intersections and to not obstruct views of the surrounding rural vistas and historic buildings.

11.4.3 Actions

Table 14 Gateway Actions		
Action	**Strategy Identifier**	**Importance Ranking (1-highest, 4-lowest)**
Develop avenue of trees along Kelso floodplain subject to flood impact assessment approval.	G12	2
Continue the gateway plantings into Bathurst along the Mitchell Highway.	G14	1
Landscape the area surrounding the visitor's information stand at Hector Park.	G16	2
Develop tree planting program in gateways to Eglinton.	G18	2
Develop tree planting program to new subdivisions	G19	1
Remove any diseased trees along Vale Road where necessary.	G20	4
Remove dying and diseased trees where necessary and undertake a replanting program to continue the avenue of trees to the Lagoon village turnoff.	G21	3
Enhance tree planting and replace trees within Rockley Village.	G23	2
Develop gateway planting in Sofala.	G24	2
Plant avenues of trees at the entrances to rural villages.	G25	1

12 FLOODPLAINS AND WETLANDS

12.1 VISION

The Macquarie River and Raglan Creek floodplain is retained predominately as a treeless plain with primary land use being for agriculture, horticulture, playing fields and wetlands.

The Council lands with wetland values are to be conserved and rehabilitated to create a viable wetland complex. In particular, the Brickpit Wetland is to be developed and restored to provide habitat for local and migratory birds.

12.2 INTRODUCTION

Council manages a number of properties within the Macquarie River and Raglan Creek floodplain that have wetland values. In particular the Brick Pit Wetland on Edgells Lane was purchased with the intention of conserving and enhancing its wetland habitat. A constructed wetland was also planned for Raglan Creek which involved reshaping the existing artificial channel on community land into a series of variable depth ponds to enable the establishment of a variety of wetland vegetation types. The investigation and design of this wetland now needs to be reviewed as Council has acquired more land across the floodplain, so the suggested location may not be the most appropriate. For the purpose of this Plan the floodplain and wetland objectives, strategies and recommendations apply only to the Macquarie River and Raglan Creek floodplains, which will not be protected by levees.

Vegetation issues on the floodplain and wetland areas upstream of the railway line and areas of Perthville are covered in different sections of the Plan or are managed for agriculture and horticulture.

In floodplain areas that are protected by levees, including the Morisset and Havannah Street areas, strategies and recommendations are non-specific and are addressed in the Streetscape/Parks and Public Reserves Sections.

MAP REFERENCES

Map A - Vegetation Themes

Map B - Significant Vegetation and Natural Landscapes

Map E - Site Specific Projects

12.3 BACKGROUND

12.3.1 Characteristics of the Floodplain

From early explorer's accounts the Macquarie River floodplain at Bathurst was essentially a treeless plain: though at the time would have been bountiful with native grasses, forbs and wetland species along Raglan Creek, meander streams, ox-bow lakes and other floodplain watercourse features. The former meandering course of the Raglan Creek within the floodplain featured wetlands created by the natural flooding processes.

Development for agriculture and channelizing of Raglan Creek in the floodplain has caused the decline of the 'wetlands' as fully functional ecological systems. The elongated 'wetlands' along Raglan Creek still function in the critical role for stormwater pollution control and provide habitat for wetland and migratory birds.

The Raglan Creek Wetland Complex has been described by Marshall (2016) as 'An outstanding wetland remnant example is the series of wet meadows, meanders, manmade channels and brick pit excavations that make up the Raglan Creek Wetland Complex on the floodplain at Bathurst. It supports impressive populations of water birds and remains valuable as wetlands to this day.'

The Brick Pit was historically used for the sourcing of material for making clay bricks. Council has acquired this ephemeral wetland in recognition of the significant habitat value it has for local and migratory wetland birds and is seeking to restore its condition and environmental quality to secure habitat for birds into the future.

Council now owns a number of parcels of land within the Kelso floodplain and hence the location of the planned constructed wetland therefore needs to be reconsidered. Consideration of the hydrological functioning of the system as a whole is also required to ensure that the wetland enhances water quality and mimics natural cycles as far as possible, in order to maximise the operation of the wetland system.

12.3.2 Values

Values for the floodplain area are diverse and range from agricultural and horticultural production to contributing to visual amenity. The latter is of high value in terms of the charter of this VMP in that it comprises a significant landscape feature in the City.

The topography of the floodplain allows for impressive views of the City and surrounding ridges and hillsides, including Mount Panorama. It is the definitive edge between the rural landscape and the cultural heritage centre of Bathurst. The floodplain has been described as the 'Edgell's Country Garden' in the Heritage Study (Hughes et al 1990) and these qualities contribute to its significance as a landscape feature.

There are also significant environmental values of the floodplains and these relate to flood routing and wetland ecology.

Wetlands provide essential feeding and breeding habitats for a variety of birds, mammals, fish, amphibians and invertebrates. They also support a large range of plant species that are crucial for the survival of fauna in the area. For example, waterbirds such as Ibis feed on agricultural pests and reduce the need for chemical pest control. Many wetlands also provide valuable services to the catchment community by supporting recreational activities such as fishing, hunting, bird watching and camping (Wilson 2003).

When combined as a linked system extending over vast areas of land, wetlands are critically important to the living creatures they support. Wetlands also play a critical role in absorbing, recycling and releasing water borne nutrients, trapping sediments, increasing the productivity of associated aquatic and terrestrial ecosystems, and mitigating the adverse impacts of floods by storing water during the peak flows and releasing it gradually (Crabb, 1997, Wilson 2003).

The Bathurst Biodiversity Management Plan identifies that a number of migratory species are known or are likely to occur in the Bathurst Regional LGA. Council therefore has a role in protecting and conserving important habitats, which are part of the JAMBA and CAMBA agreement to protect these species. Notable sightings of migratory bird species include Japanese Snipe, Sharp-tailed Sandpiper, Glossy Ibis and Australian Painted Snipe (Chris Marshall, pers comm. 2012). A number of these migratory species were once reasonably common in the Bathurst area, particularly along wetlands associated with the Macquarie River floodplain around Bathurst. They almost certainly were once present in the once ubiquitous swampy meadow system that now heavily degraded.

12.3.3 Key Reserves

a) Brick Pit Wetland

Edgells Lane Kelso, Lot A DP 408013, Lot 2 DP 1233088, Operational land.

The Brick Pit wetlands feature open water habitat during high rainfall periods with variable depths, providing a habitat for a range of birds and aquatic fauna including fish. The reed beds also filter water quality and mudflats provide macroinvertebrates for feeding habitat for birds and fish.

The local birdwatching community highly values the Brick Pit Wetlands with over 100 native bird species recorded in the area (Atlas of Living Australia, 2018) including:

- 43 wetland specific bird species;
- 4 species subject to international treaties (Bonn, JAMBA, CAMBA, and ROKAMBA);and
- 5 species listed as threatened under either the BC or EPBC Acts.

Species include:

- Australian Painted Snipe (*Rostratula australis),* Endangered and Migratory species under BC Act and EPBC Act;

- Latham's Snipe (*Gallingo hardwickii*), Migratory and marine species under EPBC Act;
- Sharp-tailed Sandpiper *(Calidris acuminata)*, Migratory species under EPBC Act);
- Freckled Duck (*Stictonetta naevosa*), Vulnerable under BC Act;
- Little Eagle *(Hieraaetus morphnoides),* Vulnerable under BC Act;
- Spotted Harrier *(Circus assimilis),* Vulnerable under BC Act;
- Red-kneed Dotterell *(Erythrogonys cinctus);*
- Black-fronted Dotterell (*Elseyornis melanops);*
- Plumed Whistling-Duck *(Dendrocygna eytoni);*
- Yellow-billed Spoonbill (*Platalea flavipes*)
- Black Swan *(Cygnus atratus);*
- White-faced Heron (*Egretta novaehollandiae);*
- Hoary-headed Grebe (*Poliocephalus poliocephalus);* and
- Australian Wood Duck (*Chenonetta jubata)*.

b) Raglan Creek Open Space

94 Stephens Lane, 71 Hereford Street, 106, 200, 208, 224 Gilmour Street Kelso; Lot 1 DP 1125206, Lot 11 DP 1140971, Lot 2 & 401 DP 1131422, Lot 2 DP 1131946, Lot 221 DP 1147157, Lot 1 DP 1223252, Lot 4 DP 1130147 Operational land.

Once part of the Raglan Creek wetland complex prior to channelling of the creek, this cleared grassland provides ecosystem services, storing peak flows during floods and gradual release. The main issue for the future of this land is being undervalued for its potential to provide enhanced wetland function and character.

Scope exists to conserve and restore the land for wetland habitat and function. The land could be a location for the planned constructed wetland or could form part of a wetland complex to integrate wetland function. This would include water management, weed control and revegetation of aquatic and riparian vegetation, and continuation of the path to the north with limited shade planting with casuarinas along riparian areas, subject to flood impact assessment.

c) Learmonth Park and Church Lane Open Space

Sydney Road, 57A Church Lane, Gilmour Street Kelso; Lot 5 DP 776928, Lot 6 DP 1142438, Lot 1 DP 792363, Lot 3 DP 1115543 Community land.

The north eastern end of Learmonth Park and Church Lane Open Space would have once been part of the Raglan Creek wetland complex before development of the sporting facilities and channelling of the creek. Due to the land's low-lying nature and presence of aquatic plants it provides limited ecosystem services by trapping sediments and cycling nutrients and open water provides limited opportunities for birds.

The northern section of Learmonth Park is the site of the original proposed constructed wetland. This location should be re-evaluated, or it could form part of a wetland complex to integrate wetland function. This would include water management, weed control, revegetation of aquatic and riparian vegetation, and continuation of the path to the north with limited shade planting of Casuarinas along riparian areas, subject to flood impact assessment.

12.3.4 Threats

For the purpose of the VMP, threats to the floodplain and wetlands only deal with vegetation, habitat, their interrelated issues, and how they impact on the integrity of the area. Therefore relevant threats include the following:

- Exotic weeds and invasive native plants degrading wetland habitat.
- Rubbish dumping including asbestos;
- Stock grazing and trampling of wetland habitat by stock or vertebrate pests;
- Draining and clearing of wetlands;
- Feral predators especially foxes and cats;

- Use of herbicides, insecticides and other chemicals near wetlands;
- Sedimentation and pollution from the Raglan Creek Catchment;
- Planting of inappropriate species that obstruct views, negatively impact on flood routing, or have potential to become environmental weeds;
- Not recognising the theme value and changing the character of the floodplain;
- Not appreciating the value of wetlands; and
- Worsening land and surface water salinization.

12.4 FLOODPLAIN VEGETATION MANAGEMENT

12.4.1 Guiding Principles

The principles that have guided the development of management strategies are to recognise and embrace:

- The restoration and management of natural wetlands;
- The visual amenity values of the Macquarie River and Raglan Creek floodplain;
- The function of the floodplain for flood routing;
- The predominant land use being agriculture, horticulture and active recreation; and
- The development of constructed wetlands.

12.4.2 Management Strategies

Table 15 Floodplain and Wetlands Strategies	
Strategies	**Recommendations**
OBJECTIVE 1 To create and enhance the Macquarie River and Raglan Creek wetland environment.	
F1. Undertake hydrological study of the Raglan Creek wetland complex	• Undertake a hydrological study of the Raglan Creek wetland complex area; and • Include a surface water assessment of the frequency and nature of flooding, and a groundwater assessment of groundwater movement between the site's aquifers, Macquarie River and Raglan Creek.
F2. Revisit the location of the planned constructed wetland	• Review the location of the off-stream wetland along Raglan Creek, currently proposed for land north of the Great Western Highway between Kelso and the Macquarie River, north of the sporting facilities at Learmonth Park; • The works to be integrated into the existing and planned land uses without compromising those uses and providing a diversification of recreational opportunities, and should include informal paths and revegetation works; and • The wetlands to be developed to provide the community with a small example of the complex of sod tussock lands, billabong and flood runner streams that existed before it was modified for agriculture, and to improve the quality of water and habitat within the Raglan Creek wetland complex.
F3. Construct wetlands and other hydrological enhancements	• Construct the off-line wetland and other environmental enhancements to improve water quality within the wetlands complex as a whole; it should include informal walkways to allow the community to experience the wetlands environment.
F4. Prepare a plan of management for the Raglan Creek wetland complex.	• Prepare a management and rehabilitation plan for the Council lands that have wetland values within the floodplain.

F5. Undertake restoration of the Brick Pit Wetland	• Undertake Brick Pit Wetland restoration works in a staged manner including: – Develop a design and management plan. – Carry out habitat enhancement works based on the recommendations of the hydrological study and in accordance with the management plan, including manipulation of local topography and water levels, revegetation, fencing upgrades and weed control. – Install further interpretative signage and investigate the possible design and construction of a bird hide and board walk to allow the community to experience the wetlands environment. – Investigate options for the ongoing management of the Brick Pit wetlands including the option of forming a Landcare Group which would jointly manage the area with Council
F6. Review the use of public land within the Raglan Creek wetland complex area	• Review the use of Council owned or managed land within the Raglan Creek wetland complex area and plan for additional wetland construction to create a viable wetland complex and provide habitat for birds, aquatic organisms and fish.
F7. Seek funding opportunities for developing wetlands environment.	• Success of project enhanced by Council, community and agency partnerships.
OBJECTIVE 2 To maintain the 'generally tree less, market garden, open space' theme identity of the Macquarie River and Raglan Creek Floodplain.	
F8. Recognise the theme characteristics of the floodplain.	• On public land limit the plantings of trees to gateways and recreational parks where they are required for amenity value; and • Utilise likely floodplain species such as Casuarinas in small group plantings where required for shade or habitat.
OBJECTIVE 3 Vegetation management on the Kelso floodplain to have a nil or negligible impact on flood routing, enhance amenity value and be environmentally sound.	

F9. Plant species selected for plantings on the floodplain to be appropriate for flood routing, aesthetics and environmental reasons.	• Only single trunked trees selected; • Multi-stemmed trees appropriately pruned or removed if deemed causing flood problems; • Trees with low branches may require canopy lifting; • Avoid the planting of large shrubs; • Trees planted in groups should be strategically planted to avoid the build-up of debris and allow for the free passage of water (i.e. plant in 'tear drop' shape); • Avoid the selection of undesirable species (Refer Appendix D); and • Use of native groundcover species is recommended as a landscaping option e.g. grasses, grass like plants (sedges, rushes, *Lomandra spp.*).

12.4.3 Actions

Table 16 Floodplain Actions

Action	Strategy Identifier	Importance Ranking (1-highest, 4-lowest)
Reinvestigate the constructed wetlands and environmental works on Raglan Creek.	F2, F3	2
Develop a Plan of Management for the Raglan Creek Wetland complex	F4	1
Restore the Brick Pit Wetland	F5	1

13 PART C (POST-PLAN PHASE) IMPLMENTATION, MONITORING AND REVIEW

13.1 IMPLEMENTATION

It is the collective responsibility of Council, government agencies, the community and interest groups to implement the strategies and recommendations outlined in this VMP. Where required on specific projects, consultation will also occur with these and other relevant stakeholders.

When new projects are formulated they are to be guided by the natural resource strategies within the VMP as well as consider best practice guidelines at the time. The implementation of the objectives of this plan complement strategies and objectives developed for the Upper Macquarie River Catchment, Central-West Region or Murray-Darling Basin.

Implementation is an on-going process which can be undertaken either immediately with the adoption of many recommendations and guidelines at nil or limited cost, or may be contingent on funding arrangements and therefore staged over a period of time. Preparing the VMP is not a quick fix to achieving the visions for vegetation management, with much of the VMP's focus requiring enormous input both in physical and financial terms.

The VMP is more about setting the framework for strategic progress to be made towards targeted goals, based on importance ranking rather than set timeframes. It is expected that the recommendations and actions presented in this report be used as a guide towards reaching those desirable, best practice land management strategies rather than basing the success of the VMP on the number of recommendations completed.

13.1.1 Specific Project Costs

The true cost of implementing the VMP is difficult to estimate, as many costs are borne by Council as part of Council's core business management, or by community based activities. There are also many strategies, recommendations and actions which cannot be costed or fall within the responsibility of other agencies or community groups.

As a guide, detailed item specific cost breakdowns are given in Appendix E.

13.2 MONITORING

The very nature of the VMP is dynamic as implementation is progressed and new issues arise. For this reason, it should be regarded as an on-going and developing plan that requires monitoring and review to keep it valid and effective.

The reporting for the Community Strategy Plan is a good vehicle for the review of the VMP and its implementation progress.

There is also scope within the report to review activities implemented by the community in response to the VMP.

13.3 REVIEW

The annual review of Council's Community, Operational and Delivery Plans, and Quarterly and Annual Reports, provide scope for highlighting achievements, identifying future actions and the requirements to undertake a review the plan.

13.4 FUNDING, SUPPORT PROGRAMS AND TAX INCENTIVES

Council provides funding of $250,000 annually towards the implementation of the VMP. Such recurrent funding is critical in ensuring that the aims and objectives of the VMP are achieved and that the specific actions are carried out.

In some instances Council may provide additional funding to complete capital works

projects. There is also opportunity to source external funds from government and other agencies through grant programs e.g. NSW Environmental Trust.

Where tree establishment or preservation of remnant native vegetation on private properties imposes net costs on an individual landholder, additional incentives may be required to achieve the outcomes recommended in this VMP. Specific works may require support measures or cost-sharing arrangements through incentive schemes, support programs or funding bodies to accomplish the desired outcomes.

13.4.1 Community Education and Engagement Programs

Running information and education programs to facilitate attitudinal changes amongst landholders and the broader community.

Programs designed for rural landholders can focus on providing information on the conservation values of conserving existing stands of native vegetation, the benefits likely to flow to the broader community and the potential on-farm benefits that may result.

Similarly, where the broader community is expected to contribute to the cost of protection and/or enhancement of native vegetation in their area, then programs designed for the broader community can focus on raising awareness of the importance of preserving this vegetation and the threats facing this resource (Gillespie 2000).

Community engagement programs can involve theme based activities such as National Tree Day, events like Breakfast Bird Watching, Nature Photography or Kayaking, and can also involve community programs such as Bushcare, Landcare, schools, Local Land Services and Community Nurseries. Council can offer support for such events and activities through small grants, Council activities and through grant and sponsorship programs (Marynissen and Campbell, 2006).

13.4.2 Management Agreements (including covenants)

Management agreements are generally voluntary and may include the provision of monetary payments to:

- compensate landholders for income foregone when they agree to conserve and manage remnant vegetation;
- assist in the on-going maintenance costs associated with conserving and managing their remnant vegetation; and
- cover the on-going maintenance costs associated with conserving and managing their remnant vegetation.

To ensure objectives are met, such agreements generally involve a contract that specifies the actions that the landholder will take.

Such schemes have been traditionally operating in NSW include the Greening Australia Whole of Paddock Restoration Program and a number of government schemes:

- Voluntary Planning Agreements under the *Environmental Planning and Assessment Act, 1979* and covenants under *the Conveyancing Act, 1919.*
- Biodiversity Stewardship Agreements (Part 5 Division 2 BC Act);
- Conservation Agreements (Part 5 Division 3 BC Act); and
- Wildlife Refuge Agreements (Part 5 Division 4 BC Act).

Under the 2016 Land Management Reforms private land conservation now focuses on three types of private biodiversity conservation agreements, but retained voluntary planning agreements. The Biodiversity Conservation Trust replaced the Nature Conservation Trust to better centralise the delivery of government based private land conservation mechanisms that spread across various government bodies.

Whilst the existing agreements remain in place, the new agreement types include:

- Biodiversity Stewardship Agreements can include an upfront market payment and permanent stewardship payments for permanent protection and management of biodiversity;

- Conservation Agreements are permanent and are supported by stewardship payments to landholders that reflect the level of management actions required for higher conservation value land where management actions are being undertaken to protect existing biodiversity values; and
- Wildlife Refuge Agreements are for landholders who want to protect the biodiversity on their property, but do not wish to enter into a long term or permanent agreement on their land.

Private Native Forestry (PNF) Property Vegetation Plans are transferred to PNF Plans under the 2016 Land Management Reforms.

13.4.3 Taxation Rebates and Concessions

Local government rate rebates or reductions

Where the broader community gains from remnant vegetation management there can be grounds for the local council seeking reimbursement of these costs from the NSW Government.

- In kind contributions of certain goods and services (e.g. labour, materials, specialist advice);
- Community or landholder undertaking; and
- Provision of '*soft*' loans, based on interest rates that are at a discount to standard market rates.

In most instances, however, no one single instrument will achieve all environmental objectives for an area. Rather, successful outcomes will most likely result from the application of a range of instruments that have been designed to address the specific issues facing landholders and the community in the Bathurst Regional LGA.

ABBREVIATIONS AND ACRONYMS

Acronym	Meaning
AEP	Annual exceedance probability
AHD	Australian height datum
ANZECC	Australian and New Zealand Environment Conservation Council
BAM	Biodiversity assessment method
BC Act	*Biodiversity Conservation Act 2016*
BC Regulation	*Biodiversity Conservation Regulation 2017*
BDAR	Biodiversity Development Assessment Report
BoM	Bureau of Meteorology
BOS	Biodiversity offset scheme
CAMBA	China Australia migratory bird agreement
CASA	Civil aviation safety authority
CBD	Central business district
CEEC	Critically endangered ecological community
CPTED	Crime prevention through environmental design principles
DA	Development application
DCP	Development control plan
DECC	Department of Environment and Climate Change
DP	Deposited plan
EEC	Endangered ecological community
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*Fisheries Management Act 1994*
HCA	Heritage conservation area
JAMBA	Japan Australian Migratory Bird Agreement
LEP	Local Environmental Plan
LG Act	*Local Government Act 1993*
LGA	Local government area
LLS	Local Land Services
LLS Act	*Local Land Services Act 2013*
NSW	New South Wales
NVP	Native vegetation panel
OEH	Office of Environment and Heritage
ROKAMBA	Republic of Korea Australia Migratory Bird Agreement

SEPP	State Environmental Planning Policy
SOS	Saving our species
Sp	Species
TEC	Threatened ecological communities
UWMP	Urban Waterways Management Plan
WSUD	Water sensitive urban design

GLOSSARY OF TERMS

Biodiversity	Variety of all species of living organisms (plants, animals and micro-organisms), the genes they possess and the ecosystems they form.
Chemical fertility	Capacity of the soil to provide adequate supplies of nutrients in proper balance for the growth of plants.
Crown lifting	Training young plants - removing competing leaders and crossing branches.
Crown reduction	Reduce the height of the tree through canopy pruning.
Crown/canopy lifting	To prune the lower branches of the tree to increase the length of the bole from ground to canopy.
Cut banks	Erosion occurring on the concave side of a meander loop.
Erosion hazard	The susceptibility of land to erosion dependent on a combination of factors including climate, landform, soil, land use and land management.
Frangible plants	Plants that are capable of absorbing vehicle impact through breaking, crushing or cushioning, thereby reducing occupant injury.
Hardsetting soils	Hardsetting soils with hard, dry and compact surfaces have high rates of runoff.
Included bark	The bark forms a ‘v’ notch at the branch union which is a structural weakness.
Lopping	Cutting between branch unions or at internodes on trees.
Point bars	The sediment body at the convex side of a meander loop.
Regulated river	A river to have the flow or supply of water augmented by a dam.
Remnant vegetation	Native tree or patch of native vegetation, which remains in the landscape after removal of most or all of the native trees or native vegetation in the immediate vicinity.
Riparian	Adjacent to or associated with the bank of a river or the foreshore of a lake or other water body.
Riparian vegetation	Vegetation occurring on or adjacent to a watercourse.
Sodic soils	A soil containing sufficient exchangeable sodium to adversely affect soil stability, plant growth and land use.
Terrace	A former floodplain. Deepening or enlargement of the stream channel has lowered the level of flooding.
Water holding capacity	The amount of water in the soil available to plants.
Wetland	Includes any shallow body of water that is inundated cyclically, intermittently or permanently with water, or vegetated with wetland plan communities.

REFERENCES AND FURTHER READINGS

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APPENDIX A – COMMUNITY CONSULTATION

COMMUNITY CONSULTATION

Community and Councillor awareness and consultation has been staged throughout the update and review of the VMP, targeting a number of community interest groups, organisations and government agencies. Avenues have also been available for the general public to make submissions in response to the VMP and to attend an open public meeting.

The community participation has been instrumental in recognising visions, values and issues, and the management options required to address them. The outcome has been the consolidation of these factors into a context that is contained within one document, namely the VMP.

The consultative phase was undertaken from early inception to the conclusive stages of the Plan development, and the processes used included the following:

- Workshop with the Bathurst Region Natural Resource Advisory Group to develop the scope of works for the VMP update;
- Online survey on the Bathurst Regional Council 'Your Say' website from 22 November 2017 to 11 January 2018;
- A Councillor Working Party on 25 October 2017;
- A public discussion forum held at the Bathurst Regional Council Chambers on 12 December 2017;
- Public exhibition of the draft Vegetation Management Plan from the 21 September to the 2 November 2018;
- Meeting with the Bathurst Region Natural Resource Advisory Group to discuss the draft plan during the public exhibition period;
- Publicity through the local media; and
- Mail outs of a letter to targeted community interest groups, organization, individuals and relevant government agencies.

Interest groups and organizations contacted in relation to the VMP are listed below:

Government Agencies

- Local Land Services;
- Central West Councils Environment and Waterway Alliance;
- National Parks and Wildlife Services;
- Office of Environment and Heritage;
- Upper Macquarie County Council; and
- Department of Primary Industries.

Organisations and Interest Groups and Residents

- Bathurst Region Natural Resource Advisory Group;
- Bathurst Community Climate Action Network;
- Boundary Road Reserve Landcare Group;
- Central Tablelands Landcare;
- Eglinton Hall and Park Committee;
- Greening Bathurst;

- Hill End & District Volunteer Bushfire BrigadeNapoleon Reef, Walang & Glanmire Residents Association;
- Napoleon Reef Landcare Group;
- Peel Flora and Fauna Trust;
- Perthville Development Group Inc;
- Raglan Community Sporting and Social Community;
- Rockley and District Community Association;
- Sofala Progress Association;
- Sunny Corner and District Progress Association;
- Trunkey Creek Progress Association;
- Wattle Flat Progress Association; and
- Yetholme Progress Association.

Community Consultation Responses

As part of the consultation, four detailed written submissions were received including from the Local Land Services. Input was also obtained during the community discussion forum which was attended by 11 people many of whom represented the various community organisations including Napoleon Reef Landcare Group, Greening Bathurst, Sunny Corner District Progress Association, White Rock Road Progress Association and the Perthville Development Group.

Council received 8 written responses on the draft VMP during the public exhibition period, including from the NSW Office of Environment and Heritage, Bathurst Community Climate Action Network, Greening Bathurst and the Peel Native Flora and Fauna Management Committee. Council held a meeting with the Bathurst Region Natural Resource Advisory Group during the exhibition period to gain input on the plan, which was attended by 4 representatives from Greening Bathurst, National Parks and Wildlife Services, Boundary Road Reserve Landcare Group, and the Peel Native Flora and Fauna Management Committee.

APPENDIX B – KEY ACHIEVEMENTS OF ORIGINAL VEGETATION MANAGEMENT PLAN 2003

KEY ACHIEVEMENTS OF THE ORIGINAL VEGETATION MANAGEMENT PLAN 2003

Hector Park Wetlands (2002- 2005)

One of the first projects completed under the Vegetation Management Plan was the Hector Park wetlands. The works involved Willow removal and the construction of an earth embankment to act as a retention basin dam above a series of smaller sedimentation and retention basins formed by utilising rock gabions to create a sequence of pools and riffles. Within each basin, aquatic plants were planted to assist in improving the quality of the water which flows through Jordan Creek and ultimately into the Macquarie River. Trees, shrubs and grasses from the local Box-Gum Woodland were planted along the banks of the wetland.

Brooke Moore Reserve (2005 – Ongoing)

The "Saving Brooke Moore Woodland" project was completed in 2005-07 and included the fencing of 4 hectares of Grassy Box Woodland at the corner of Alexander and Suttor Streets. On-site activities included a flora survey, an educational field day, installation of nest boxes, weed control and revegetation to rehabilitate the remnant.

A 0.8ha ecological burn was carried out in Autumn 2018 to improve the diversity of flora in the reserve.

Reviving Raglan Creek (2007 – 2012)

The "Reviving Raglan Creek" project was completed across seven sections of Raglan Creek throughout Raglan and Kelso. The aim of the project was to reduce erosion, enhance the stability of the creek banks, and improve the biodiversity, water quality and visual appearance of the creek. Onground works involved removing invasive woody weeds such as Willows and Blackberries and eradicating any other undesirable species affecting the condition of the creek. Rock structures were installed at two sites, and over 3200 native trees, shrubs and grasses were planted across the creek bed and banks. Signs were installed and a teacher resource kit was produced as part of the educational component of the project.

Restoring Corridor Connectivity of Box-Gum Woodland, White Rock (2008-2012)

A 1.5ha cleared area located at the southern end of White Rock Road was revegetated to improve the connectivity of remnants of Box-Gum Woodland with the riparian vegetation of the Macquarie River.

Sawpit Creek (2007 – Ongoing)

The "Sawpit Creek Redevelopment" project included willow removal, the revegetation of a 1.5km reach of Sawpit Creek and the installation of instream erosion control structures. The "Rehabilitation of Sawpit Creek" project is currently underway and includes erosion control works, weed control, and revegetation within Sawpit Creek near the confluence with the Macquarie River.

Jordan Creek (Browning Street Reserve & Blayney Road Common) (2010 – Ongoing)

Weeds were removed from 430m of Jordan Creek within Browning Street Reserve and Blayney Road Common. The banks of the creek were mulched, in-stream sediment control structures installed, and several thousand native trees, shrubs and grasses were planted. The work and effort by volunteers whom carried out the works was recognised by the Central West Catchment Management Authority in 2011 through a Champions of the Catchment Award.

Hawthornden Creek (2010 – Ongoing)

A Weeds of National Significance project was undertaken to control Willows along the Charles Sturt University section of Hawthornden Creek in 2011. The following stages of the creek rehabilitation have been completed and included the installation of several rock structures which stabilised the bed and banks in key areas including Boundary Road Reserve (2011), Charles Sturt University (2013),

Jaques Park and Ray Morcom Reserve (2014) . These sections of the river were also revegetated with Box-Gum Woodland species to improve riparian habitat.

Within the Jaques Park section of Hawthornden Creek, Council's Community Environmental Engagement Officer and volunteers have been weeding, collecting rubbish and planting tubestock for a number of years. Hawthornden Creek Drainage Reserve was also replanted with native trees, shrubs, sedges and rushes.

Racing to Save the Mount Panorama Woodlands (2010 – 2016)

The "Racing to Save the Mount Panorama Woodlands" project involved a range of environmental management activities to rehabilitate the remnant Box Gum Grassy Woodlands on the slopes and foothills of Mount Panorama. Key works included:

- Over 4000 native trees, shrubs and grasses associated with the Box-Gum Woodland were planted within the project area.
- Ten erosion control structures (one rock dams) were installed within the ephemeral creeks to reduce erosion. Coir logs were also installed in Jorden creek to slow the flow of water and the resulting erosion.
- Old agricultural fencing was removed and replaced with "fauna friendly" fencing.
- Noxious weed control and rabbit control programs were implemented across the project area to reduce competition and encourage natural regeneration.
- A management plan was prepared for the White Box Woodland (now known as Albens Reserve) that outlines how the reserve will be conserved and managed.
- A large public education program was undertaken to reduce the unlawful removal of timber, dumping of garden waste, keeping dogs on leashes and cats indoors at night.

The project was the overall winner of the 2014 Natural Environment Protection and Enhancement: On-ground Works category at the Local Government NSW Excellence in the Environment awards. The project was also nominated for a Prime 7 Regional Achievement & Community Award under the 'Peabody Energy Environment & Landcare Award' category, and was listed as a finalist in the NSW Green Globe Awards

Urban Drainage Reserve Vegetation Link (2010-2012)

The Urban Drainage Reserve Vegetation Link project sought to improve habitat linkages across the urban landscape, reduce soil erosion, improve water quality and increase community awareness about urban environmental issues. Five sites were established in Kelso, Windradyne and Llanarth, with around 25,000 seedlings planted. More than 70 volunteers attended community planting days to assist with the revegetation, with some continuing to be involved at the sites.

Blayney Road Common Biodiversity Project (2011 – Ongoing)

The Blayney Road Common Biodiversity project has included control of both woody and grass weeds, rabbit control, and erosion control. Box-Gum Woodland species have been planted across the reserve and nest boxes installed.

Restoring Regent Honeyeater Habitat in the Bathurst Region (2013-2017)

The project involved a range of environmental management activities to restore a section of the Macquarie River using plants that support the critically endangered Regent Honeyeater. Willows were removed from along 620m of the riverbank, and replaced with approximately 5000 native riparian trees, shrubs, and grasses. A Seed Production Area of local provenance species from the Casuarina Gallery Forest and Box-Gum Woodland communities was also established to provide a seed source for future revegetation projects. Other works involved fencing the perimeter of the park to restrict vehicle access with the aim of reducing erosion and vandalism. A Plan of Management was also prepared to guide how the park and riverbank will be conserved and managed into the future. The project won a highly commended award at the 2016 Local Government NSW Excellence in the Environment awards within the Natural Environment Protection and Enhancement: On-ground Works category.

Macquarie River (2005 – Ongoing)

Willow control and revegetation has occurred along much of the Macquarie River from Gormans Hill to Apex Jubilee Reserve in Stewarts Mount, with the aim of improving biodiversity, habitat, and reducing flooding impacts and erosion. Key projects include:

- In 2016, approximately 2000 native riparian trees, shrubs and grasses were planted from Jordan Creek to the Waste Water Treatment Plant to replace previously removed willows.
- Revegetation was undertaken along the entire length of the riverbank within Jubilee Reserve and parts of Ophir Road Reserve (2011-ongoing).
- The Recovery of the Mac project was undertaken in 2017-18 in collaboration with the Sofala Branch of the CAS, Central Tablelands Local Land Services, DPI (Fisheries), and the Central West Councils Environment and Waterway Alliance. The project involved the modification of two artificial weirs within Bicentennial Park to allow fish passage, Willow control and riparian revegetation within Gormans Hill.
- Willows and other woody weeds were controlled and over 5000 native riparian plants were planted along 620m of the Macquarie River within Rankens Bridge and O'Keefe Park. The works were part of the Restoring Regent Honeyeater Habitat in the Bathurst Region project (2013-2017).

Boundary Road Reserve (Ongoing)

Annual funding is provided to the Boundary Road Reserve Landcare Group to manage Boundary Road Reserve. The landcare group carry out weed control, track maintenance, revegetation, rubbish collection and other management activities to rehabilitate the Box-Gum Woodlands. The reserve was also part of "Racing to Save the Mount Panorama Woodlands" project.

Community Planting & Maintenance (2006 – Ongoing)

Council contracts a Community Environmental Engagement Officer to engage the local community in environmental projects and programs across Bathurst. The officer hosts community tree planting days where volunteers contribute to revegetation and weed control works within the creeks, river, parks and reserves across Bathurst. The Officer also hosts water bug surveys and flora and fauna walks for school groups and community members.

Gateway Tree Planting (2015-2016)

Landscape entrance feature statements to the Mid-Western and Mitchell Highways were constructed in 2015. The statements involved the installation of mound works, brick and concrete feature walls, pillar features, signage, lighting, and the planting of approximately 46 trees and over 2,900 grasses and shrubs.

Street Trees

A Street Tree Audit was completed as per the recommendations of the VMP which included a data base of all trees within the Bathurst Heritage Conservation Area, the main city entrance roads, as well as the villages of Hill End and Rockley. Council also undertakes an annual s94 street tree planting and replacement program.

Mowing modifications

The mowing modification project consisted of creating no-mow zones in a number of sites in and around Bathurst to promote natural regeneration in these areas.

Cycleways & Walkways

Cycleways/Walkways have been constructed along Darwin Drive Drainage Reserve, Rosemont Avenue Drainage Reserve, and linking Eglington to Bathurst. The Kath Knowles Pathway was constructed in 2013 to follow the river from Rankens Bridge to Ophir Road.

APPENDIX C – THREATENED ECOLOGICAL COMMUNITIES

THREATENED ECOLOGICAL COMMUNITIES

White Box Yellow Box Blakely's Red Gum Woodland

The White Box Yellow Box Blakely's Red Gum Woodland (Box-Gum Woodland) is listed as an endangered ecological community (EEC) in the *Biodiversity Conservation Act 2016 (BC Act 2016)* and as critically endangered under the *Environment Protection and Biodiversity Conservation Act (EPBC Act 1999)*

Box-Gum Woodland was once widespread. However, the lower fertile footslopes and flats that support these woodlands were also the areas generally preferred for cropping, pasture and infrastructure development. As a result, Box-Gum Woodland is now severely reduced in area and remnants tend to be highly isolated and fragmented. Remnants with a full range of flora and fauna species are very rare (NPWS 2002a).

The Box-Gum Woodland is characterised by the presence or prior occurrence of White Box, Yellow Box or Blakely's Red Gum. The woodland includes vegetation where grass and herbaceous species generally characterise the ground layer. Shrubs are generally sparse or absent, though they may be locally common (NPWS 2002b).

The definition of the Box-Gum Woodland recognises that some remnants are degraded. Highly disturbed sites that have few if any native species in the understorey are specifically included in the community provided vegetation, either understorey or overstorey or both, would, under appropriate management, respond to assisted natural regeneration, such as where the natural soil and associated seed bank are still at least partially intact (NPWS 2002b).

Sites where there is unlikely to be sufficient seed remaining in the soil for the understorey or overstorey to regenerate are not part of the EEC. For example, trees under which intensive cropping of annual crop species has occurred and is ongoing, and trees within urban backyards are unlikely to be part of the community. Conversely, trees with exotic pastures underneath and those in larger urban open spaces will generally be part of the community (NPWS 2002b).

Tableland Basalt in the Sydney Basin and South Eastern Highlands Bioregions

The Tableland Basalt in the Sydney Basin and South Eastern Highlands Bioregions is listed as an EEC under the BC Act and is not listed in the EPBC Act (1999).

Tableland Basalt Forest is dominated by an open eucalypt canopy of variable composition. *Eucalyptus viminalis, E. radiata, E. dalrympleana subsp. dalrympleana* and *E. pauciflora* may occur in the community in pure stands or in varying combinations. The community typically has an open canopy of eucalypts with sparse mid-story shrubs (e.g. *Acacia melanoxylon* and *A. dealbata*) and understory shrubs (e.g. *Rubus parvifolius*) and a dense groundcover of herbs and grasses, although disturbed stands may lack either or both of the woody strata. The structure of the community varies depending on past and current disturbances, particularly fire history, clearing and grazing. Contemporary tree-dominated stands of the community are largely relics or regrowth of originally taller forests and woodlands, which are likely to have had scattered shrubs and a largely continuous grassy groundcover. At some sites, mature trees may exceed 30 m tall, although regrowth stands may be shorter than 10 m tall.

Tableland Basalt Forest is currently found in the Eastern Highlands and Southern and Central Tablelands, covering the local government areas of Bathurst Regional, Goulburn Mulwaree, Oberon, Palerang, Shoalhaven, Upper Lachlan and Wingecarribee. The community, however, may be found elsewhere within the designated bioregions.

Tableland Basalt Forest typically occurs on loam or clay soils associated with basalt or, less commonly, alluvium, fine-grained sedimentary rocks, granites and similar substrates that produce relatively fertile soils. The species composition of Tableland Basalt Forest varies with average annual rainfall. On basalt or plutonic substrates east of Mittagong and Moss Vale, at the eastern edge of its

distribution where average rainfall exceeds 1000-1100 mm per year, the community is replaced by Robertson Basalt Tall Open-forest and Mount Gibraltar Forest. Its distribution spans altitudes from approximately 600 m to 900 m above sea level, usually on undulating or hilly terrain. Mean annual rainfall varies from approximately 750 mm up to 1100 mm across the distribution of the community.

Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions

The Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions is listed as an EEC under the BC Act 2016 and is not listed under the EPBC Act 1999.

This community, commonly referred to as Tablelands Snow Gum Grassy Woodland, occurs as an open-forest, woodland or open woodland. This community may also occur as secondary grassland where the trees have been removed, but the groundlayer remains. The main tree species are *Eucalyptus pauciflora* (Snow Gum), *E. rubida* (Candlebark), *E. stellulata* (Back Sallee) and *E. viminalis* (Ribbon Gum), either alone or in various combinations. Other eucalypt species may occur. A shrub layer may be present and sub-shrubs are common. The most common shrubs include *Melicythus* sp. 'Snowfields' (Gruggly-bush) and *Melichrus urceolatus* (Urn Heath). The ground layer is grassy, with the most common species including *Themeda australis* (Kangaroo Grass), Poa spp. (snow-grasses), *Austrostipa* spp. (spear-grasses) and *Rytidosperma* spp. (wallaby-grasses). Sites in high condition have a range of forb (wildlfower) species, including *Leptorhynchos squamatus* (Scaly-buttons), *Chrysocephalum apiculatum* (Common Everlastings) and *Asperula conferta* (Native Woodlruff). Many threatened flora and fauna species have been recorded in this community. The community commonly occurs on valley floors, margins of frost hollows and on footslopes and undulating hills. It occurs between approximately 600 and 1400 m in altitude on a variety of substrates, including basalt, sediments, granite, colluvium and alluvium.

Tablelands Snow Gum Grassy Woodland occurs in the South Eastern Highlands Bioregion; part of this region is the 'Southern Tablelands' and the northern section of the bioregion is the 'Central Tablelands. There are outlying occurrences of this community in the Sydney Basin, South East Corner and NSW South Western Slopes Bioregions, where suitable habitat exists.

Habitat and Ecology:

- Characterised by the presence or prior occurrence of Snow Gum, Candlebark, Ribbon Gum and/or Black Sallee trees;
- The trees may occur as pure stands, mixtures of the four species or in mixtures with other trees, including wattles;
- Commonly co-occurring eucalypts include Apple Box (*Eucalyptus bridgesiana*), Swamp Gum (*E. ovata*), Black Gum (*E. aggregata*), Mountain Gum (*E. dalrympleana*), Broad-leaved Peppermint (*E. dives*) and Narrow-leaved Peppermint (*E. radiata*) and commonly occurring tree-layer or mid-layer wattles include Blackwood (*Acacia melanoxylon*) and Silver Wattle (*A. dealbata*);
- The understorey in intact sites is characterised by native grasses and a high diversity of herbs; the most commonly encountered include Kangaroo Grass (*Themeda australis*), Common Snow-grass (*Poa sieberiana*), River Tussock (*Poa labillardierei*), Short Snow-grass (*Poa meionectes*), various wallaby-grasses (*Rytidosperma* spp.), various spear-grasses (*Austrostipa* spp.), Common Everlasting (*Chrysocephalum apiculatum*), Scaly-buttons (*Leptorhynchos squamatus*), Common Woodruff (*Asperula conferta*), Wattle Mat-rush (*Lomandra filiformis*), St John's Wort (*Hypericum gramineum*), Stinking Pennywort (*Hydrocotyle laxiflora*) and Slender Tick-trefoil (*Desmodium varians*);
- Shrubs are generally sparse or absent, though they may be locally common. Sub-shrubs (woody species <0.5 m tall) may be common. The most common shrubs and sub-shrubs include Gruggly-bush (*Melicytus* sp. 'Snowfields'), Urn Heath (*Meichrus urceolatus*), Sweet Bursaria (*Bursaria spinosa*) and Mountain Mirbelia (*Mirbelia oxylobioides*);

- Remnants may occur on the lower, more fertile parts of the landscape where resources such as water and nutrients are abundant; sites on midslope situations where resources are scarcer are more common;
- Sites with particular characteristics, including varying age classes in the trees, patches of regrowth, old trees with hollows and fallen timber on the ground are very important as wildlife habitat; sites with a full range of such attributes are rare;
- Sites in the lowest parts of the landscape often support large trees which have leafy crowns and reliable nectar flows - sites important for insectivorous and nectar feeding birds; such trees also have the largest hollows;
- Sites that retain only a grassy groundlayer and with few or no trees remaining are important for rehabilitation, and to rebuild connections between sites of better quality;
- Remnants support many species of threatened fauna and flora;
- Retention of remnants is important as they contribute to productive farming systems (stock shelter, seed sources, sustainable grazing and water-table and salinity control);
- The fauna of remnants (insectivorous birds, bats, etc.) can contribute to insect control on grazing properties;
- Some of the component species (e.g. wattles, native legumes) fix nitrogen that is made available to other species in the community, while fallen timber and leaves recycle their nutrients; and
- Disturbed remnants are considered to form part of the community, including where the vegetation would respond to assisted natural regeneration.

Montane peatlands and swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highland and Australian Alps bioregions

The Montane peatlands and swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highland and Australian Alps bioregions is listed as an EEC under the BA Act 2016 and as Endangered under the EPBC Act 1999.

Montane Peatlands and Swamps comprise a dense, open or sparse layer of shrubs with soft-leaved sedges, grasses and forbs. It is the only type of wetland that may contain more than trace amounts of Sphagnum spp., the hummock peat-forming mosses. Small trees may be present as scattered emergents or absent.

The community typically has an open to very sparse layer of shrubs, 1-5 m tall, (e.g. *Baeckea gunniana, B. utilis, Callistemon pityoides, Leptospermum juniperinum, L. lanigerum, L. myrtifolium, L. obovatum, L. polygalifolium).* Species of Epacris (*e.g. E. breviflora, E. microphylla, E. paludosa*) and Hakea microcarpa are also common shrubs. In some peatlands and swamps, particularly those with a history of disturbance to vegetation, soils or hydrology, the shrub layer comprises dense thickets of Leptospermum species. In other peatlands and swamps with a history of grazing by domestic livestock, the shrub layer may be very sparse or absent.

Montane Peatlands typically have a dense groundcover of sedges, grasses and forbs, except where a dense cover of tall shrubs casts deep shade. Soft-leaved species of Carex (e.g. *C. appressa, C. fascicularis, C. gaudichaudiana)* and *Poa (e.g. P. costiniana, P. labillardieri)* typically make up most of the groundcover biomass, while other common sedges include *Baloskion spp., Baumea rubiginosa, Empodisma minus, Juncus spp.* and *Schoenus apogon.*

Forbs growing amongst the sedges include *Drosera* spp., *Geranium neglectum, Gratiola* spp., *Mitrasacme serpyllifolia, Ranunculus spp.* and *Viola* spp. Hummocks of Sphagnum moss may occur amongst other components of the ground layer.

The continuity of the ground layer may be interrupted by erosion, trampling, partial clearing or earthworks. There may be considerable variation in soils and species composition between and within individual peatlands and swamps. Regionally, a number of species are confined to the northern or southern parts of the community's distribution. Locally, toward the margins of any particular peatland or swamp, the average watertable depth typically declines, the mineral content of surface soils increases and hydrophilic plant species are replaced by species that are less tolerant of waterlogged

conditions. For a comprehensive list of species that characterize the community open the Scientific Determination link in the top right box.

Montane Peatlands and Swamps may be distinguished from Upland Wetlands of the Drainage Divide of the New England Tableland bioregion, also listed on Schedule 1 of the Threatened Species Conservation Act 1995, by several biological and physical characteristics. The latter community has fewer woody plants, a greater component of aquatic herbs, is based on substrates with less peat and higher mineral content, and has shallow temporary to near-permanent standing water, cf. a varying depth of seeping water within Montane Peatlands and Swamps.

The Montane Peatlands and Swamps EEC is currently known from parts of the Local Government Areas of Armidale Dumaresq, Bega Valley, Bellingen, Blue Mountains, Bombala, Cooma-Monaro, Eurobodalla, Gloucester, Greater Argyle, Guyra, Hawkesbury, Lithgow, Oberon, Palerang, Severn, Shoalhaven, Snowy River, Tenterfield, Tumbarumba, Tumut, Upper Lachlan and Wingecarribee but may occur elsewhere in these bioregions.

The community is currently known from conservation reserves including Werrikimbee, Barrington, Kanangra-Boyd, Monga, Wadbilliga, South East Forests and Kosciuszko National Parks. However, these examples are generally small, unrepresentative of the range of variation in the community, affected by past disturbances and continue to be threatened by some of the processes listed below. Analogous communities occur in Victoria, where the community is listed as threatened under the Flora and Fauna Guarantee Act, and in the Australian Capital Territory.

Losses of Montane Peatlands and Swamps due to land clearing are difficult to estimate. However, estimates vary from about 20% in the Guyra district to more than 75% in the far southeast of NSW.

The Montane Peatlands community is associated with accumulated peaty or organic-mineral sediments on poorly drained flats in the headwaters of streams. It occurs on undulating tablelands and plateaux, above 400-500 m elevation, generally in catchments with basic volcanic or fine-grained sedimentary substrates or, occasionally, granite.

Natural Temperate Grassland of the South Eastern Highlands

The Natural Temperate Grassland of the South Eastern Highlands is not listed under the BC Act. However it is listed as Critically Endangered under the EPBC Act 1999.

Natural Temperate Grassland is a natural grassland community dominated by a a range of perennial grass species and, in highly intact sites, containing a large range of herbaceous species in many plant families, including daisies, peas, lilies, orchids and plants in many other families, all collectively known as forbs, or "wildflowers" in the case of the more showy species. A number of distinct associations have been described, identified by combinations of the co-occurring grasses and forbs, and each found in particular regions and/or landscape positions.

The community is often treeless, though trees of a range of species may occur in low densities, either as isolated individuals or in clumps. Seasonally wet areas within a site may also contain a range of wetland flora species, including rushes, sedges and a variety of wetland specialist forbs. A limited range of shrub species may occur at some sites, but these too occur in low densities.

Many of the flora species of the community are threatened. The community supports a range of fauna species, some of which are unique to grassland communities, or if not unique, are restricted to sites with grassy ecosystems (i.e. grassy woodland communities). Many of these fauna species, including several birds and reptiles and an invertebrate (Golden Sun Moth, Synemon plana), are listed as threatened.

Natural Temperate Grassland is confined to the Southern Tablelands, a region bounded by the ACT, Yass, Boorowa, the Abercrombie River, Goulburn, the Great Eastern Escarpment, the Victorian border and the eastern boundary of Kosciusko National Park. The community occurs in a number of distinct plant associations (see Armstrong et al., 2013). According to the association present, the community is found in various topographical positions and on a variety of substrates. The altitudinal range of the community is between 500 m and 1200 m asl. The community is found on broad sweeping plains with poor drainage and cold air inversions that promote frosts which inhibit tree growth; on all topographical locations, including upper-slopes, crests and plateaux on basalt

landscapes; and in frost hollows in areas otherwise dominated by woodlands or forests. The community may also occur in a landscape mosaic with several woodland communities.

Habitat and Ecology

- There are eight distinct associations within the community (Armstrong et al., 2013), known as r1 through to r8. One association (r1) is found in cool, moist, high-altitude sites that rim the Monaro region. Association r2 is dominated by River Tussock (*Poa labillardierei*) and occurs in damp flats and drainage lines. Association r3 is also found in damp areas but has less River Tussock and a co-occurrence of other grass, rush and forb species;
- Association r4 is confined to the lake beds of Lake George and Lake Bathurst during long droughts; it is co-dominated by a blown-grass and various wetland forbs and sedges. Another widespread association is r5, found in most of the areas occupied by r7 - see below (Armstrong et al., 2013); and
- The cold, dry, rain shadow parts of the Monaro are occupied by association r6. It is marked by a set of forbs, sub-shrubs and shrubs confined to the Monaro. Association r7 is found in the moister lowland parts of the outer Monaro region, and also in the upper Shoalhaven River valley and areas around Canberra (ACT). Another relatively restricted association is r8, found on steep, exposed sites in the mid-Murrumbidgee catchment and in the upper Shoalhaven and Goulburn districts (Armstrong et al., 2013).

APPENDIX D – SPECIES LISTS

SPECIES LISTS

The list of ornamental species given below is not exhaustive. It is to be used as a guide only, with many other native and exotic species suitable for specific requirements.

ORNAMENTAL SPECIES			
Scientific Name	**Common Name**	**Features/requirements**	**Suggested Planting**
Large exotic deciduous trees			
Acer macrophyllum	Oregon Maple	(30 m) Yellow/orange autumn colours.	Parks, wide street tree, Conservation Area
Acer pseudoplatanus	Sycamore	(25-30 m) Pronounced trunk, slightly open crown. Autumn foliage not impressive.	Parks, planting along Kelso floodplain incorporated with other species.
Acer saccharinum	Silver Maple	(30 m) Yellow autumn foliage. Not suitable for dry environment.	Parks, large street tree, Conservation area
Aesculus hippocastanum	Horse Chestnut	(20 m) Fertile, moist, well-drained soil.	Parks on floodplain soils or in Conservation Area provided soils have high water holding capacity.
Alnus incana	Grey Alder	(15-20 m) Cold wet areas and poor soils.	Recreational parks and street trees on floodplain soils.
Castanea sativa	Spanish Chestnut	(15-25 m) Yellow autumn colouring, edible fruits.	Parks, street tree, Conservation Area
Fraxinus angustifolia	Narrow-leafed Ash	(15-20 m) Yellow autumn foliage. Ash species prone to ash dieback disease.	Street tree, parks and Conservation Area
Fraxinus excelsior 'Aurea'	Golden Ash	(30-40 m) Greenish yellow in summer, yellow autumn colouring, moist sites. Can be directionally pruned around wires. Ash species prone to ash dieback disease.	Parks, street tree, Conservation Area
Gleditsia triacanthos 'Sunburst'	Gleditsia	(25 m) Golden autumn foliage. Can be directionally pruned around wires.	Street tree, despite autumn colouring, not recommended for Conservation Area
Liquidambar styraciflua	Liquidambar	(30 m) Red/orange autumn colouring.	Suburban street tree where nature strip

ORNAMENTAL SPECIES			
Scientific Name	**Common Name**	**Features/requirements**	**Suggested Planting**
		Directional pruning may be necessary when young.	watered. Not recommended under power lines.
Liriodendron tulipifera	Tulip Tree	(50 m) Fertile, well-drained soil.	Parks, street tree
Plantanus orientalis	Oriental Plane	(20-30 m) Yellow brown autumn foliage. Can be directionally pruned around wires.	Parks, tree for wide streets, Conservation Area
Platanus x hybrida	London Plane	(30 m) Yellow brown autumn foliage. Can be directionally pruned around wires.	Parks, tree for wide streets, Conservation Area
Populus nigra 'Italica'	Lombardy Poplar	(40 m) Columnar, moist soils.	Recreational parks and street trees on floodplain soils, gateway tree from Perthville, feature tree.
Populus trichocarpa	Cottonwood Poplar	(30 m). Autumn colour, dull yellow brown.	Vale Road gateway,
Populus yunnanesnsis	Yunnan Poplar	(25 m) Distinct main trunk and ascending branches, yellow autumn foliage. Avoid root damage to prevent suckering.	Large scale street tree
Quercus bicolour	Swamp White Oak	(15-25 m) Yellow brown autumn foliage	Parks, large scale street trees on more fertile soils, floodplain, Conservation Area.
Quercus cerris	Turkey Oak	(20-30 m) Yellowish brown autumn colour	Parks
Quercus ilex	Holly Oak	(25 m) Slow growth in early stages, dense shade. Can be directionally pruned around wires.	Parks, canopy too dense for street tree planting.
Quercus lusitanica	Portuguese Oak	(12-18 m) Stout main trunk and spreading branches, dense foliage.	Form not suitable for street tree. Parks
Quercus palustris	Pin Oak	(20-25 m) Scarlet/red brown autumn colouring.	Parks, large scale street trees on more fertile soils, floodplain.
Quercus robur	English Oak	(20 m) Yellow brown autumn foliage.	Parks, large scale street trees on more fertile soils,

ORNAMENTAL SPECIES			
Scientific Name	**Common Name**	**Features/requirements**	**Suggested Planting**
			floodplain, Conservation Area.
Quercus rubra	Red Oak	((20-25 m) Erect main trunk and horizontal lateral branches. Red autumn foliage.	Parks
Robinia pseudoacacia 'Frisia'	Robinia	(20 m) Greenish yellow in summer, yellow in autumn. Can be directionally pruned around wires.	Street tree, despite autumn colouring, not recommended for Conservation Area.
Tilia cordata	Linden	(25 m) Erect trunk, broad domed crown.	Parks, Conservation Area
Zelkova serrata	Keyaki	(20 m) Distinct trunk and ascending branches. Can be directionally pruned around wires.	Requires moist site. Irrigated parks
Medium Deciduous Trees			
Acer buergeranum	Trident Maple	(6-10 m) Keep wind protected to avoid leaf damage. Fertile and friable soil.	Street tree
Acer campestre	English Maple	(6-10 m) Yellow autumn colouring	Parks, street tree, Conservation Area
Acer negundo	Box Elder Maple	(12-15 m) Yellow autumn foliage, can be directionally pruned around wires.	Parks, car parks, street tree, Conservation Area. Avoid near riparian zones, drainage areas and native vegetation.
Acer saccharum	Sugar Maple	(12-15 m) yellow/orange/scarlet autumn colouring.	Street tree, Conservation Area
Alnus cordata	Italian Alder	(12 m) Moist soil, yellow autumn colouring.	Suburban street tree where nature strip watered, Conservation Area
Betula pendula	Silver Birch	(12-15 m) Slender, white bark.	Mass planting as landscape feature where irrigated
Catalpa bignoniodes	Indian Bean Tree	(10-12 m) Large leaves, wind protection.	Street tree
Celtis australis	Nettle Tree	(12-15 m) Pale	Parks, street tree and

ORNAMENTAL SPECIES			
Scientific Name	**Common Name**	**Features/requirements**	**Suggested Planting**
		yellow autumn foliage.	Conservation Area
Cercis siliauastrum	Judas Tree	(5-10 m) Prune to central leader if multi-branching.	Street tree, parks
Cornus spp	Dogwood	(5-10 m) Fertile, well drained and moist soils.	Suburban street tree where nature strip watered
Fraxinus oxycarpa	Desert Ash	(12-15 m) Yellow autumn foliage. Ash species prone to ash dieback disease, especially if stressed.	Parks, street tree, Conservation Area, car parks.
Fraxinus syriaca	Syrian Ash	(12-15 m) Yellow autumn foliage, suited to dry climates. Ash species prone to ash dieback disease, especially if stressed.	Parks, street tree
Fraxinus pennysylvanica	Ash	(15-20 m) Pronounced main trunk and open crown. Ash species prone to ash dieback disease, especially if stressed.	Street tree, parks
Fraxinus velutima	Velvet Ash	(8-10 m) Yellow autumn foliage, suited to dry climates. Ash species prone to ash dieback disease, especially if stressed.	Parks, street tree, Conservation Area
Fraxinus 'Raywood'	Claret Ash	(15-20 m) Ascending branches. Claret red autumn colouring. Can be directionally pruned around wires. Ash species prone to ash dieback disease, especially if stressed.	Street tree, parks
Koelria paniculata	Pride of China, Golden Rain Tree	(10-15 m) Tolerant of hot, dry summers and cold winters.	Street tree, parks, car parks
Melia azedarach	White Cedar*	(10 m) Yellow autumn foliage, can be directionally	All locations except floodplain, and riparian zones (invasive)

ORNAMENTAL SPECIES			
Scientific Name	**Common Name**	**Features/requirements**	**Suggested Planting**
		pruned under power lines.	
Pistacia chinensis	Chinese Pistacia	(10 m). Can be directionally pruned around wires.	Street tree, parks, car parks
Populus tremula	European Aspen	(6-10 m) Single trunk and open crown. Suckers vigorously when roots cut or disturbed. Orange and crimson autumn colouring.	Selected planting in fertile moist areas, HCA,
Populus tremuloides	Quaking Aspen	(10-15 m) Suckers vigorously when roots cut or disturbed. Orange-red, yellow autumn colouring.	Selected planting in fertile moist areas, Vale Road gateway planting.
Populus simonii	Simon's Poplar	(10 m) Erect trunk and ascending branches forming a slender upright cone.	Selected planting in fertile moist areas
Populus simonii "Fastigata'	Simon's Poplar, erect form	(10 m) Narrow erect columnar form, resembling small Lombardy poplar.	Selected planting in fertile moist areas
Pyrus ussuriensis	Manchurian Pear	(12-15 m) Crimson autumn foliage. Can be directionally pruned around wires.	Street tree, parks,
Quercus robur 'Fastigiata'		(12 m) Upright, columnar form of dense habit. Yellow brown autumn foliage.	Parks, large scale street trees on more fertile soils, floodplain, Conservation Area.
Sorbus domestica	Service Tree	(10-15 m) Yellow to orange autumn foliage.	Street tree, Conservation Area
Sophora japonica	Japanese Pagoda Tree	(10 m) Tolerant of temperature extremes. Can be directionally pruned around wires.	Parks, street tree, car parks
Ulmus parvifolia	Chinese Elm	(12-15 m) Spreading branches. Yellow/orange red autumn foliage. Can be directionally	Parks, car parks

ORNAMENTAL SPECIES			
Scientific Name	**Common Name**	**Features/requirements**	**Suggested Planting**
		pruned around wires.	
Small Trees			
Arbutus unedo	Strawberry Tree	(8 m) Evergreen, broad-domed crown. Bright scarlet fruit from April to June. Early directional pruning to develop main trunk and to crown lift for adequate sight distance.	Street tree, suitable for under power lines
Lagerstroemia indica	Crepe Myrtle	(6-8 m) Prune to central leader. Main branches form a v-shaped crown. Prominent pink, white or mauve flowers from summer to autumn.	Street tree, suitable for under power lines
Laurus nobilis	Bay Laurel	(6-7 m). Evergreen, lateral branches low on trunk, requires crown lifting as street tree.	Street tree, screening plant (shrub or tree form), parks and gardens.
Malus spp	Crab Apple	(4-8 m) Small tree, directionally prune to central leader.	Street tree, suitable for under power lines or small scale plantings.
Prunus sibhirtella	Higan Cherry	(6-8 m) Small erect tree. Autumn colour, pink flowers in spring.	Street tree, suitable for under power lines
Prunus x blireana	Plum	(4-5 m) Does not produce fruit. Pruning when young maybe necessary to produce dominant leader required to allow for adequate sight distance.	Street tree where small tree required due to scale, power lines or views.
Large Conifers			
Many genera including *Cedrus, Picea, Larix, Abies, Pinus, Pseudotsuga*	Cedars, Spruce, Larch, Fir, pines.	Evergreen. Many colours and forms.	Parks, windbreaks, Heritage Conservation Area
Metasequoia glyptostroboides	Redwood	Deciduous. Yellow, pink and bronze in autumn.	Floodplain planting in parks, wide street tree planting

ORNAMENTAL SPECIES			
Scientific Name	**Common Name**	**Features/requirements**	**Suggested Planting**
Taxodium distichum	Swamp Cypress	Deciduous	Floodplain planting in parks, wide street tree planting
Ginko biloba	Maidenhair Tree	Deciduous	Parks, attractive foliage
Native Trees Suitable for Landscaping			
Angophora floribunda	Rough-barked Apple	(12-22 m) Fibrous bark, twisting branches with dense crown. Grows best on alluvial soils.	Parks, open spaces
Eucalyptus leucoxylon var macrocarpa	Large Podded Yellow Gum	(8 m) Smooth barked gum.	Street tree,
Eucalyptus scoparia	Wallangarra White Gum	(12 m) Smoothed barked gum, cream bark, open canopy.	
Blisters, Roundabouts and Median Strips			
Small, dwarf and prostrate conifers various species		Foliage colour ranges through red, golden, grey and green, and habit from conical, domed, prostrate and columnar.	CBD / Conservation Area Blisters and roundabouts.
Native, and native-like sub-shrubs genera including Correa, Grevillea, Eriostemon, Erica,	Native Fuchsia, Wax Flower, Heath	Evergreen, various foliage shape and plant form. Subtle flowers.	Medium strips, roundabouts outside heritage areas. Native theme areas
Exotic sub-shrub genera including Cistus, Coleonema, Euryops, Hebe, Lavandula, Nandina, Punica, Raphlolepis, Santolina	Rock Rosme, Euryops, Diosma, Lavender, Dwarf Scared Bamboo, Dwarf Pomegranate, Hawthorn, Cotton Lavender	Evergreen, various foliage and flower colours, foliage shape and plant habit.	CBD / Conservation Area Blisters and roundabouts

STREET TREES – SOME UNDESIRABLE CHARACTERISTICS		
Scientific Name	**Common Name**	**Reason**
Cedrus spp.	Cedars	Apical dominance, undesirable under power lines
Liquidambar styracifua	Liquidambar	Apical dominance, undesirable under power lines
Melia azaderach	White Cedar	Suitable in areas other than near watercourses and remnant vegetation due to easy spread of tree from seed.
Prunus cerasifera “Nigra”	Purple Cherry-plum	Availability of fruits increase the population of Currawongs which predate on other bird species
Ulmus glabra ‘Lutescens’	Golden Wych Elm	Prone to leaf beetle attack
Ulmus procera	English Elm	Prone to leaf beetle attack
Eucalyptus nicholii	Small-leaved Peppermint	Liable to uproot as they can tend to be shallow rooted

NATIVE PLANTS SUITABLE FOR REVEGETATION PROJECTS	
Scientific Name	**Common Name**
Local tree species with good fauna attributes	
Eucalyptus albens	White Box
Eucalyptus blakelyii	Blakely’s Red Gum
Eucalyptus bridgesiana	Apple Box
Eucalyptus dalrympleana	Mountain Gum
Eucalyptus dives	Broad-leaved Peppermint
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus melliodora	Yellow Box
Eucalyptus polyanthemos	Red Box
Eucalyptus viminalis	Ribbon Gum
Acacia dealbata	Silver Wattle
Acacia implexa	Hickory Wattle
Acacia mearnsii	Black Wattle
Acacia melanoxylon	Blackwood
Allocasuarina diminuta	Dwarf She-oak
Allocasuarina littoralis	Black She-oak
Allocasuarina verticillata	Drooping She-oak
Brachychiton populneus	Kurrajong
Callitris endicheri	Black Cypress pine

NATIVE PLANTS SUITABLE FOR REVEGETATION PROJECTS	
Scientific Name	**Common Name**
Callitris glaucophylla	White Cypress pine
Casuarina cunninghamiana	River She-oak
Local shrub species with good fauna attributes	
Acacia buxifolia	Box-leaf Wattle
Acacia genistifolia	Early Wattle
Acrotiche serrulata	Honeypots
Brachyloma daphnoides	Daphne Heath
Bursaria spinosa	Blackthorn
Callistemon citrinus	Crimson Bottlebrush
Callistemon sieberi	River Bottlebrush
Calytrix tetragona	Common Fringe Myrtle
Cassinia longifolia	Shiny Cassinia
Coprosma quadrifida	Native Current
Correa reflexa	Common Correa
Daviesia latifolia	Broad-leafed Bitter Pea
Dillwynia juniperina	Prickly Parrot Pea
Dillwynia sericea	Showy Parrot Pea
Dodonaea viscosa	Sticky Hop-bush
Grevillea floribunda	Seven Dwarfs Grevillea
Hakea dactyloides	Finger Hakea
Hibbertia riparia	Erect Guinea Flower
Indigofera andesmiifolia	Tick Indigo
Indigofera australia	Austral Indigo
Leptospermum grandifolium	Wooly Teatree
Leptospermum myrtifolium	Myrtle Teatree
Leucopogon lanceolatus	Lance-leaved Beard Heath
Lomatia myricoides	Long-leaf Lomatia
Melichrus urceolatus	Urn-heath
Melicytus dentatus	Tree Violet
Myoporum montanum	Western Boobialla
Olearia elliptica	Sticky Daisy-bush
Olearia ramulosa	Twiggy Daisy-bush r
Persoonia linearis	Narrow-leaf Geebung
Persoonia rigida	Hairy Geebung
Pomaderris prunifolia	Plum Leaf Pomaderris
Pteridium esculentum	Bracken Fern

NATIVE PLANTS SUITABLE FOR REVEGETATION PROJECTS	
Scientific Name	**Common Name**
Pultenaea procumbens	Heathy Bush Pea
Styphelia triflora	Pink Five-corners
Local groundcover species with good fauna attributes	
Acacia gunnii	Ploughshare Wattle
Acaena novaezelandia	Bidgee-widgee
Acaena ovina	Australian Sheeps Burr
Asplenium flabellifolium	Common Maidenhair Fern
Brachyloma daphnoides	Daphne Heath
Dillwynia phylicoides	Small-leaf Parrot Pea
Einadia polygonoides	Saltbush
Hardenbergia violacea	False Sarsaparilla
Scleranthus biflorus	Cushion Bush
Swainsona galegifolia	Smooth Darling Pea
Local grass and grass-like species with good fauna attributes	
Aristida spp.	Wire Grass
Austrodanthonia spp.	Wallaby Grass
Austrostipa spp.	Spear Grass
Bothriochloa macra	Red-leg Grass
Chloris truncata	Windmill Grass
Dianella revoluta	Blue Flax Lily
Dianella tasmanica	Tasman Flax Lily
Joycea pallida	Silvertop Wallaby
Lomandra filiformis	Wattle Mat Rush
Lomandra longifolia	Spiny-headed Mat Rush
Lomandra multiflora	Many-flowered Mat Rush
Microlaena stipoides	Weeping Rice Grass
Poa sieberiana	Poa Tussock Grass
Stypandra glauca	Nodding Blue-lilly
Themeda australia	Kangaroo Grass
Local wildflower species with good fauna attributes	
Brachyscome multifida	Cut-leaf Daisy
Calotis anthemoides	Cut-leaved Burr-daisy
Calotis cuneifolia	Purple Burr-daisy
Chrysocephalum apiculatum	Common Everlasting
Chrysocephalum semipapposum	Clustered Everlasting
Clematis glycinoides	Headache Vine

NATIVE PLANTS SUITABLE FOR REVEGETATION PROJECTS	
Scientific Name	**Common Name**
Dichopogon fimbriatus	Nodding Chocolate Lilly
Goodenia hederacea	Forest Goodenia
Hardenbergia violacea	False Sarsaparilla
Pimelea curviflora	Curved Rice Flower
Ranunculus lappaceus	Common Buttercup
Stypandra glauca	Nodding Blue-lily
Viola betonicifolia	Native Violet
Vittadinia cuneata	Fuzzweed
Vittadinia gracilis	Wooly New Holland Daisy
Wahlenbergia luteola	Bluebell
Wahlenbergia stricta	Tall Bluebell
Local wetland and riparian species with good fauna attributes	
Carex Appressa	Sedge
Cyperus gracilis	Slender Flat-sedge
Gahnia aspera	Rough Saw Sedge
Juncus australis	Austral Rush
Juncus usitatus	Common Rush
Lepidosperma laterale	Variable Sword Sedge
Phragmites australis	Common Reed
Typha domingensis	Cumbungi

Sourced from the Backyards for Wildlife; A Guide to Creating Habitat for Native Animals (Bathurst Regional Council 2011)

WEEDS & UNDESIRABLE PLANT SPECIES IN AREAS OF NATIVE REMNANT VEGETATION		
Scientific Name	**Common Name**	**Reason**
Chamaecystisus palmensis	Tree Lucerne, Tagasaste	Invasive
Cotoneaster spp.	Cotoneaster	Invasive, fruit attracts undesirable bird species
Crataegus monogyna	Hawthorn	Invasive
Cystisus spp.	Broom	Invasive
Genista monspessulana	Broom	Invasive, replaces native shrubs and groundcovers
Ligustrum spp.	Privet (small and broad leaved)	Invasive, fruit attracts undesirable bird species
Lycium ferocissimum	African Boxthorn	Harbours rabbits, invasive
Pinus radiata	Radiata Pine	Invasive
Prunus spp.	Plum species	Garden escape, easily colonises, detracts from native landscape

WEEDS & UNDESIRABLE PLANT SPECIES IN AREAS OF NATIVE REMNANT VEGETATION		
Scientific Name	**Common Name**	**Reason**
Rosa rubiginosa	Sweet Briar	Invasive
Rubus fruiticosa	Blackberry	Invasive, harbours rabbits, foxes, feral pigs
Salix spp.	Willows	Deleterious to waterways
Silybum marianum	Variegated Thistle	Replaces native groundcovers, visually degrading
Vinca major	Blue Periwinkle	Garden escape, easily colonises, suppressing native groundcover species

UNDESIRABLE PLANT SPECIES ALONG STREAMS AND AQUATIC ENVIRONMENTS		
Scientific Name	**Common Name**	**Reason**
Acer negundo	Box Elder Maple	Readily establishes from seed
Cotoneaster spp.	Cotoneaster	Invasive, fruit attracts undesirable bird species
Crataegus monogyna	Hawthorn	Invasive
Hedera helix	Ivy	Invasive
Ligustrum spp.	Privet (small and broad leaved)	Invasive, fruit attracts undesirable bird species
Melia azadarach	White cedar	Has potential to readily colonise riverine habitats due to dispersal of seed by birds and ease of establishment. Particularly if seeds are transported downstream to warmer environments.
Populus spp.	Poplars (all forms – white, Lombardy, Yuan)	Sucker readily and become invasive
Prunus spp.	Plum species	Garden escape, easily colonises, detracts from native landscape
Pyracantha spp.	Pyracantha	Potential to spread from seed with birds dispersing seed. The shrub then becomes difficult to control.
Robinia spp.	Robinia species	Suckers readily and may be difficult to control in riparian or watercourse environment.
Rubus fruiticosa	Blackberry	Invasive, harbours rabbits, foxes, feral pigs
Salix spp.	Willows (all forms – weeping, crack, tortured)	Invasive, contributes to degradation of aquatic environment.

APPENDIX E – COSTINGS

COSTINGS

Listed below are costs associated with undertaking certain activities for each of the management categories. The tables are to be used as a guide only and any project development or proposal should be costed out thoroughly.

These costs have been calculating by taking the costs from the previous VMP document and allowing for inflation. We used the Australian Bureau of Statistics Consumer Price Index Inflation Calculator. We benchmarked these costs against those in The Cost of Revegetation (Schirmer & Field 2000) and Restoring Natural Areas in Australia (Buchanan 2009), and actual prices and quotes where available.

NATIVE REMNANT VEGETATION

Specific to native vegetation and waterways, there are numerous costs associated with revegetation projects, including:

- Project planning and management;
- Transport costs;
- Mechanical and chemical site preparation;
- Fencing costs;
- Plant and fertiliser purchase costs;
- Planting costs (including planting stock, fertiliser and watering);
- Tree guard costs; and
- On-going maintenance and monitoring.

As a consequence, the actual cost of the revegetation will vary with:

- Whether seed, seedlings, seedlings or existing seed stores in the soil and in the vegetative cover at the site are used;
- The type of native flora established on the site;
- The stocking rate;
- The type of fencing and/or tree guards used;
- The equipment used for site preparation;
- The weed and/or pest control method used; and
- Whether manual follow-up watering is conducted.

Generic Activity	Indicative Cost
Link remnant vegetation areas	Approx. $4,075 to $5,780 per ha to establish new plantings (incl fencing), plus $16 - $47/ha/annum for ongoing maintenance.
Fencing out remnant vegetation	$5,000 per km for materials. On-going maintenance costs around a further $25 per ha per annum.
Fencing repair	$65-$100/m (ServiceSeeking 2016)
Weed control, especially on noxious weeds such as Sweet Briar, Blackberry, Hawthorn and African Boxthorn	Where manual cutting and painting of woody weeds is involved, the cost is around $570 - $4,280 per ha. Where just slashing is involved, the cost is reduced to $75 - $320* per ha.
Post planting watering during establishment	Costs for this activity range from about $14.26 to $385 per ha (based on 1,000 seedlings per ha) but may average around $355 per ha.

Maintain weed and pest control	Approx. cost is $30 - $60 per ha per annum. (Example quote for primary removal of woody weeds and hand weeding at a highly degraded riparian bushland site is $68,465/ha. Cost of secondary weeding at the same site is $128,600/ha and finally maintenance weeding is $31,200/ha).
Restrict stock access to vegetation corridors.	Fencing cost is $1,285 to $3,565 per km.
Revegetate where necessary	New plantings will cost around $4,065 - $5,150* per ha for direct seeding, $4,160* - $5,790 ha for planting tubestock, and $5,250 - $6,755* ha for planting seedlings (incl. fencing.) Cost to supply and install per plant = $5

*These costs have been benchmarked using The Cost of Revegetation (Schirmer & Field 2000) and Restoring Natural Areas in Australia (Buchanan 2009) applying the ABS CPI rates.

WATERWAYS

Generic Activity	Indicative Cost
Willow removal	Approx. $21,395 per km of river frontage treated (excl. the cost of community labour.
River restoration	Approx. $4,065 per ha for direct seeding, $5,250 per ha for planting seedlings and $5,775 per ha for planting tubestock, based on a planting density of $1,425 eucalypts per ha equivalent (fencing and individual tree guards included). Cost of longstem native tubestock planting to supply and install per plant = $10
Control, remove and manage environmental weeds such as Blackberries and regenerating Willows	Cost ranges from $105 per ha for slashing woody weeds, through $715 - $5,705 per ha for manual cutting and painting of woody weeds, to $5,350 per ha for manual chipping out weeds with a mattock.
Establishment of native riparian vegetation	$4,075 to $5,790 per ha (incl. fencing and tree guard costs).
Planting native trees and shrubs in clumps	$3,690 to $5,790 per ha (incl. fencing and tree guard costs).
Continue Willow management following removal	Cost likely to be at around $145 to $430 per km for follow-up maintenance and removal.

STREETSCAPE

Generic Activity	Indicative Cost
Street tree planting	The cost of establishing new street trees will vary with: • The species selected; • The maturity of the trees; • The degree of site preparation; • Whether fertiliser and mulch is applied at planting; • The type of tree guards used; • The weed control method used; • Whether a manual or automated watering system is installed (if at all); and • Whether supplementary watering, weed management, fertilising, and/or mulching is required. Approx. $60 per tree for immature plants and $145 - $360 per tree (semi-mature), depending on species selection, site preparation, planting methods and maturity. To plant one linear kilometre of trees is approximately $10,505 (Refer cost breakdown for details).
Maintenance of street trees	• Tree maintenance costs vary with the condition and age of the trees, the maintenance required, and access issues (e.g. proximity to power lines and structures such as roads, fences and buildings). However, costs could be expected to range from $30 - $60 for shaping and general maintenance of immature trees to $86 - $285 for pruning and removal of damaged limbs on mature trees; • Directional pruning for 1km of new street trees is $715; • For 1km of trees the estimated on-going annual pruning cost of established trees is $970 (refer cost breakdown for details); and • Watering for 1 km of trees per year is $915 (Refer cost breakdown for details).
Tree removal	Tree removal costs also vary with the species and age of the trees, and access issues (e.g. proximity to power lines and structures such as roads, fences and buildings). However, costs for complete removal could be expected to range from $450 - $2,000 per tree. Where trees are in close proximity to above ground power lines the cost of having power cut to the site must also be included.

PARKS AND PUBLIC RESERVES

Generic Activity	Indicative Cost
Group planting trees	Approx. planting costs range from $4,075 per ha (incl. fencing and individual tree guards) for direct seeding, through to $5,800 per ha (incl fencing) for planting tubestock. Cost is reduced by $1,700 per ha where fencing is not required. Tree guards consist of milk cartons with 2 stakes, and the assumed planting density is 1,000 trees per ha. Follow-up watering may cost anywhere from $15 - $390 per ha per year, depending on distance travelled, and frequency of watering required. Costs would increase up to $115 per tree, if the number of trees planted at each site was less or if more mature trees were planted. Follow-up maintenance in the early years (incl mulching and watering) equals approx. $200-230/yr. Approx. cost for exotic species is $4,280 to $6,420 per ha equivalent, based on 1000 plants per ha.
Tree maintenance	Tree maintenance costs vary with the condition and age of the trees, the maintenance required, and access issues (e.g. proximity to power lines and structures such as roads, fences and buildings). However, costs could be expected to range from $250 - $350 for shaping and general maintenance of immature trees to $350 - $550 for medium trees, $600 - $1000 for large trees and $900 - $1800 for extra large trees for pruning and removal of damaged limbs (McInerney 2018).

GATEWAYS

Generic Activity	Indicative Cost
Tree planting	Approx. $60 per tree for immature plants and $145 - $360 per tree (semi-mature), depending on species selection, site preparation, planting methods and maturity.
Removal of woody weeds+	Where manual cutting and painting of woody weeds is involved, the cost is around $570 - $6,390* per ha. Where just slashing is involved, the cost is reduced to $110 per ha.

Generic Activity	Indicative Cost
	Slashing of grass and emerging woody weeds costs approx. $110 - $320* per ha.
Directional pruning	Cost will approx. $110 to $360 per tree, depending on the work involved.
Tree removal	Tree removal costs also vary with the species and age of the trees, and access issues (e.g. proximity to power lines and structures such as roads, fences and buildings). However, costs for complete removal could be expected to range from $300 - $10,000 per tree (Schneider 2017).
Deep ripping by tractor	Costs approx. $90- $475* per ha. This increases up to $235 per ha when a large bulldozer is used. Weed and pest control costs prior to planting can cost $355 per ha.

*These costs have been benchmarked using The Cost of Revegetation (Schirmer & Field 2000) and Restoring Natural Areas in Australia (Buchanan 2009).

Cost Breakdown

To plant one linear kilometre of trees

Site preparation

Generally no advance site preparation

Plant material

Average cost/tree = $115
55 trees at 15-20 m spacings **$6,325**

Hardware/soil enhancement etc.

2 stakes		$ 15
200 gms Terracottem		$ 10
Stem guard		$ 10
Tree mesh		$ 10
	Total/tree	$ 45
Total/km		**$2,475**

Planting

Total/tree including plant and labour = $45
Total/km $2,475

Total to install 1 km $11,275

Maintenance of New Street Trees

Watering

Based on previous years' experience, water truck is required for 10 x 8hr days/year.

Water truck at $115/hr (watering for new plantings for two years, as weather demands).

Total for watering per year (based on 1km of plantings/year) $9,200

Directional pruning

For new plantings, pruning occurs at years 3 and 4 and then every 5 years. Therefore, 3 prunings over 10 years, each pruning requiring tree gang for two days for 1km of trees.

Hence, 6 days over the first 10 years, @$1,215/day = $7,290 over ten years, or, estimated cost for annual directional pruning of 1km of new street trees.

$730

Ongoing pruning

For established trees, pruning at approximately 5 years.
Estimated time of 4 days/1km.
Hence, 8 days/10 years @ $1,215/day = $9,720 over 10 years, or, estimated cost of annual pruning of 1km of established street trees. **$975**

WETLAND COSTS

COSTING TO CARRY OUT REVEGETATION WORKS TO ESTABLISH WETLANDS		
Component	**Description**	**$/sq m**
Preliminary Weed Control	High level of Willow infestation, OR	$1.25
	Mix of woody and herbaceous weed, OR	$0.50
	Largely herbaceous vegetation	$0.05
Bank Stabilisation NB: installation only	Mass plant (native) hyco cells) 15 hyco cells/sq m (supply and plant @ $0.67/cell), OR	$10
	Hydroseed application incorporating rye/fescue mix, fertiliser, wood fibre and tackifier, OR	$0.60
	Broadcast exotic grass seed	$0.05
Riparian/Woodland assemblage plantings (by tubestock)	Site preparation (Rip and spray) Plants, stakes guards ($3.85/plant) Planting ($0.57) Aftercare (weed control + minimal water/2 years)	$0.10 $0.35 $0.05 $0.05 total $0.55
Riparian/Woodland species (by direct seeding)	Site preparation Direct seed Aftercare (weed control + minimal water/2 years)	$0.10 $0.10 $0.05 total $0.25
Aquatic plantings	Plant stock - $0.60/plant @4 plants/sq m Planting Aftercare (weed control)	$2.40 $2.40 $0.10 total $4.90

Please note these costs don't include plant equipment, floating and operator costs.

COSTING REFERENCES

These costs have been calculated using the following references.

Consumer Price Index Inflation Calculator on the website of Australian Bureau of Statistics http://www.abs.gov.au/websitedbs/d3310114.nsf/home/Consumer+Price+Index+Inflation+Calculator

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ServiceSeeking (2016) Cost of fence repair, Accessed June 2016 from: https://www.serviceseeking.com.au/blog/cost-of-fence-repair/

Toolijooa (2018) Quotation for restoration of degraded riparian land.

APPENDIX F – MAPS AND FIGURES

APPENDIX G – PRIORITY WEEDS: CENTRAL TABLELANDS REGIONAL STRATEGIC WEED MANAGEMENT PLAN 2017

Common & Scientific N*ame*	Prevent	Eradicate	Contain	Asset protection	Alert	Community Concern
African boxthorn (Lycium ferocissimum)				State and Regional		
African lovegrass (Eragrostis curvula)						Regional
African marigold (Cineraria lyratiformis)						Regional
African olive (Olea europaea subsp. cuspidate)			Regional			
Alligator weed (Alternanthera philoxeroides)			State			
Anchored water hyacinth (Eichhornia azurea)	State					
Arrowhead (Sagittaria platyphylla)	Regional					
Asparagus weeds (Asparagus spp.)				State		
Athel pine (Tamarix aphylla)				State		
Bathurst burr (Xanthium spinosum)						Regional
Bellyache bush (Jatropha gossypiifolia)				State		
Bitou bush (Chrysanthemoides monilifera subsp. Rotundata)			State			
Black knapweed (Centaurea xmoncktonii)	State					
Blackberry (Rubus fruticosus agg.)				State and Regional		
Blue heliotrope (Heliotropium amplexicaule)						Regional
Boneseed (Chrysanthemoides monilifera subsp. Monilifera)		State				
Bridal creeper (Asparagus asparagoides)				State and Regional		
Bridal veil creeper (Asparagus declinatus)	State					
Broomrape (Orobanche spp. (except O. cernua var. australiana and O.	State					

Common & Scientific N*ame*	Prevent	Eradicate	Contain	Asset protection	Alert	Community Concern
minor)						
Burr ragweed (Ambrosia confertiflora)	Regional					
Cabomba (Cabomba caroliniana)				State		
Cabomba (Cabomba spp.) (except C.furcata)					Regional	
Cape broom (Genista monspessulana)				State and Regional		
Cat's claw creeper (Dolichandra unguis-cati)				State	Regional	
Chilean needle grass (Nassella neesiana)			Regional	State		
Chinese violet (Asystasia gangetica subsp. Micrantha)					Regional	
Common prickly pear (Opuntia stricta) (Opuntia spp. also listed in Asset Protection for whole of state)						Regional
Coolatai grass (Hyparrhenia hirta)				Regional		
Cylindropuntia (Cylindropuntia spp.) (naturalised in NSW)	Regional			State		
Espartillo (Amelichloa brachychaeta; A.caudata)					Regional	
Eurasian water milfoil (Myriophyllum spicatum)	State					
Fireweed (Senecio madagascariensis)			Regional	State		
Frogbit / Spongeplant (Limnobium spp.) (all species)	State					
Gamba grass (Andropogon gayanus)	State					
Giant Parramatta grass (Sporobolus fertilis)	Regional					
Giant Reed (Arundo donax)			Regional			
Gorse			Regional	State		

Common & Scientific Name	Prevent	Eradicate	Contain	Asset protection	Alert	Community Concern
(Ulex europaeus)						
Green cestrum (Cestrum parqui)				Regional		
Harrisia (Harrisia spp.)		Regional				
Hawkweed (Hieracium spp.) (all species)	State					
Honey locust (Gleditsia triacanthos)			Regional			
Horsetails (Equisetum spp.)	Regional					
Hydrocotyl/water pennywort (Hydrocotyle ranunculoides)	State					
Hygrophila (Hygrophila costata)	Regional					
Karoo acacia (Vachellia karroo (syn. Acacia karroo)	State					
Kidneyleaf mudplantain (Heteranthera reniformis)					Regional	
Kochia (Bassia scoparia) (excluding subsp. trichophylla)	State					
Koster's curse (Clidemia hirta)	State					
Lagarosiphon (Lagarosiphon major)	State					
Lantana (Lantana camara, L. madagascariensis)				State		
Long-leaf willow primrose (Ludwigia longifolia)	Regional					
Madeira vine (Anredera cordifolia)				State	Regional	
Mesquite (Prosopis spp.)				State		
Mexican feather grass (Nassella tenuissima)	State					
Miconia (Miconia spp.) (all species)	State					
Mikania vine (Mikania micrantha)	State					

Common & Scientific N*ame*	Prevent	Eradicate	Contain	Asset protection	Alert	Community Concern
Mimosa (Mimosa pigra)	State					
Mother-of-millions (Bryophyllum spp.)				Regional		
Nodding thistle, Scotch thistle and Illyrian thistle (Carduus nutans, Onopordon acanthium, Onopordon illyricum)						Regional
Noogoora burr (Xanthium occidentale)						Regional
Olive hymenachne (Hymenachne amplexicaulis)				State		
Ox-eye daisy (Leucanthemum vulgare)				Regional		
Parkinsonia (Parkinsonia aculeate)		State				
Parthenium weed (Parthenium hysterophorus)	State					
Peruvian primrose (Ludwigia peruviana)	Regional					
Pond apple (Annona glabra)	State					
Prickly acacia (Vachellia nilotica)	State					
Privet (Ligustrum ssp.)			Regional			
Rhus tree (Toxicodendron succedaneum)						Regional
Rubber vine (Cryptostegia grandiflora)	State					
Sagittaria (Sagittaria platyphylla)				State		
Salvinia (Salvinia molesta)				State	Regional	
Scotch broom (Cytisus scoparius subsp. Scoparius)				State and Regional		
Senegal tea plant (Gymnocoronis spilanthoides)					Regional	
Serrated tussock				State and		

Common & Scientific N*ame*	Prevent	Eradicate	Contain	Asset protection	Alert	Community Concern
(Nassella trichotoma)				Regional		
Siam weed (Chromolaena odorata)	State					
Silverleaf nightshade (Solanum elaeagnifolium)			Regional	State		
Spanish heath (Erica lusitanica)			Regional			
Spiny burrgrass (Cenchrus spinifex (syn. C. incertus and Cenchrus longispinus)			Regional			
Spotted Knapweed (Centaurea stoebe subsp. Micranthos)	State					
St John's wort (Hypericum perforatum)				Regional		
Sweet briar (Rosa rubiginosa)						Regional
Sycamore maple (Acer pseudoplanatus)						Regional
Tiger pear (Opuntia aurantiaca) (Opuntia spp. also listed in Asset Protection for whole of state)				Regional		
Tropical Soda Apple (Solanum viarum)		State				
Tutsan (Hypericum androsaemum)				Regional		
Water Caltrop (Trapa spp. (all species))	State					
Water Hyacinth (Eichhornia crassipes)			State			
Water lettuce (Pistia stratiotes)					Regional	
Water Soldier (Stratiotes aloides)	State					
Willows (Salix spp.) (excludes S.babylonica, S.x calodendron & S. x reichardtii)				State		Regional
Witchweed (Striga spp.)	State					

Common & Scientific N*ame*	Prevent	Eradicate	Contain	Asset protection	Alert	Community Concern
(except the native S. parviflora)						
Yellow Burrhead (Limnocharis flava)	State					

APPENDIX H – VEGETATION COMMUNITIES AND THREATENED SPECIES

Vegetation Community Classifications

Vegetation communities in the Bathurst Region are associated with various soil landscapes, with various dominant eucalypts linked to underlying geology and topography across the Central West (Bower *et al.,* 2002, and Keith, 2011).

Vegetation has been classified at various state level by Keith (2014) in the table and at the regional scale as outlined below.

At the regional level there are broad habitat types which sits at the highest level (BHTs) (Goldney, 2007). Underneath this classification are broad vegetation types (BVTs) that are mapped for the LGA (DEC, 2006, 2008). This has recently been transitioned into plant community types (PCTs) (OEH, 2017).

This information has been largely derived from Applied Ecology Biodiversity Issues Paper (2010) and the above references. Currently there has not been a systematic flora survey for the Bathurst Region by the Royal Botanic Gardens.

State Classification

Vegetation classes and formations in NSW have been identified by Keith (2004), and those that occur in the Bathurst Region are shown below:

Table NSW Vegetation Classes and Formations (Keith, 2004)

NSW Class	NSW Formation
Southern Tableland Wet Sclerophyll Forests	Wet Sclerophyll Forests (Grassy subformation)
Sydney Montane Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby subformation)
Southern Tableland Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby subformation)
Western Slopes Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby subformation)
Western Slopes Grassy Woodlands	Grassy Woodlands
Subalpine Woodlands	Grassy Woodlands
Grassy Woodlands	Subalpine Woodlands
Temperate Montane Grasslands	Grasslands
Eastern Riverine Forests	Forested Wetlands
Upper Riverina Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/grass subformation)

Regional Classification

Broad Habitat Type - Dry Sclerophyll Forests of the Ranges and Tablelands

This aligns with North-west Slopes Dry Sclerophyll Woodlands, Upper Riverina Dry Sclerophyll Forest, South-east Dry Sclerophyll Forest (upper), Sydney Montane Dry Sclerophyll Forest (upper), Southern Tableland Dry Sclerophyll Forest, Western Slopes Dry Sclerophyll Forest (Keith, 2004).

It includes the following broad vegetation types BVTs (DEC, 2008) and has been matched to potential plant community types (OEH, 2017):

- BVT40 Red Box (Red Stringybark) open-forest – PCT1089;
- BVT47 Blakely's Red Gum - Manna Gum woodland – PCT282;
- BVT12 Red Stringybark and/or Ironbark open-forest – PCT1095;

- BVT43 Scribbly Gum - Brittle Gum - Box woodland – PCT 324;
- BVT5 Red Stringybark (Brittle Gum) open-forest – PCT 351;
- BVT17 Blakely's Red Gum - Rough Barked Apple woodlands of the slopes – PCT 281;
- BVT2 Sydney Sandstone woodland/open-forest – PCT1181;
- BVT41 Stringybark - Box - Gum Woodland – PCT290/ PCT287;
- BVT45 Red Stringybark - Blakely's Red Gum -Yellow Box woodland – PCT352;
- BVT6 Scribbly Gum woodland – PCT322; and
- BVT42 Tumbledown Red Gum - Black Cypress Pine – Red Box low woodland on hills – PCT1279.

This BHT occurs on infertile soils, often shallow and sandy, in areas which generally have 500-800 mm annual rainfall. Topography ranges from steep to flat, and includes ridges and slopes across a broad altitude range (750-1200 m AHD in Bathurst region), stony ridges and gorges, sandstone and granite outcrops (Goldney et al, 2007). In most parts of the catchment, 30-70% of this vegetation remains, so that it is less fragmented than many other habitat types.

The canopy is 10-30 m in height and dominated by eucalypts, with a mix of species that is dependent on altitude. Common species include Mountain Ash, Peppermint, Stringybarks, White Box, Blakely's Red Gum, Bundy, Red Box, Red Stringybark, Mugga Ironbark, as well as Kurrajong, Black and White Cypress Pine. Understorey tends to be shrub dominated, with grasses rare to occasional, and a diverse set of herbs, vines and scramblers (Goldney et al, 2007).

Habitats include tall trees with feeding, roosting and nesting habitats, groundcovers, litter layer, decorticating bark, and hollows in older eucalypts. This habitat type is known to support 53 species of birds, 3 species of marsupials, 6 species of bats, 12 lizards, 3 snakes and 1 frog species and comprises around 94% of extant vegetation in the Bathurst 1:100 000 mapsheet area (Goldney et al, 2007).

Broad Habitat Type - Tall Open Forests of the Ranges and Tablelands

This aligns with Southern Tablelands Woodlands and Subalpine Forests (Keith, 2004). It includes the following vegetation types (DEC, 2008):

- BVT25 High altitude gum tall open-forest on fertile soils of the central tablelands – PCT1070, PCT1191;
- BVT1 Mountain Gum - Peppermint forest at high altitudes – PCT730;
- BVT4 Mountain Gum - Red Stringybark open-forest at high altitudes - PCT9;
- BVT41 Stringybark - Box - Gum Woodland – PCT290; and
- BVT45 Red Stringybark - Blakely's Red Gum -Yellow Box woodland – PCT352.

This BHT occurs on moderate to highly fertile clay loam soils, generally derived from shales and basalts, and occasionally limestone at elevations 600-1000 m AHD. These forests occur on moderately sloping hills and valleys between the escarpment and grassy woodlands on drier parts of the tablelands. Annual rainfall ranges from 750-1300 mm per year, with most of this BHT highly fragmented due to clearing for pasture or pine plantations (Goldney et al, 2007).

The canopy layer is dominated by Eurabbie (*E. bicostata*), Apple Box (*E. bridgesiana*), Mountain Gum (*E. dalrympleana*), Broad and Narrow-leaved Peppermints (*E. dives* and *E. radiata*), and Ribbon Gum (*E. viminalis*). Tree density varies from 500 - 1000 stems/ha (Goldney et al, 2007). Main shrubs include *Acacia sp*., *Cassinia sp*., and *Hibbertia sp*., and these are present in highly varied densities. Groundcover was originally continuous diverse herbs, grasses, ferns and climbers, although this is now in variable condition.

Broad Habitat Type -Grassy Woodlands of the Slopes and Alluvial Plains

This aligns with Western Slopes Grassy Woodlands (Grassy White Box Woodlands), Floodplain Transition Woodlands (Keith, 2004). It includes the following vegetation types (DEC, 2008):

- BVT70 Yellow Box woodland on flats and alluvial terraces of the slopes – PCT83; and
- BVT78 White Box - Kurrajong woodland – PCT1308.

This BHT occurs on fertile clay loam soils of the upper floodplains and peneplain margins on slopes and plains with annual rainfall 500-800 mm per year (Goldney et al, 2007). More than 90% cleared across eastern Australia, and the remnants highly fragmented. Clay subsoils set hard when dry, forming an impenetrable surface that inhibits plant establishment – compaction by stock trampling exacerbates the degradation.

Box eucalypts in the woodlands include White Box (*E. albens*), Yellow Box (*E. melliodora*), Blakely's Red Gum (*E. blakelyi*), Kurrajong (*Brachychiton populneus*), and White Cypress (*Callitris glaucophylla*) on the slopes, and Grey Box (*E. microcarpa*), Bimble Box (*E. populnea*), *Casuarina cristata*, Yarran (*Acacia homalophylla*), Bulloak, White Cypress, Kurrajong and Belah on the alluvial plains (Goldney et al, 2007). Trees average 15-25 m in height with well-developed crowns, and have a density of 30-40 trees per hectare. Shrubs are generally sparse, and include *Bursaria*, *Cassinia*, *Eremophila* and *Pimelea* on the slopes, and *Abutilon*, *Acacia*, Rosewood, Whitewood, *Dodonea*, *Myoporum*, *Eremophila*, *Senna* and Saltbush on the plains. Groundcover is long-lived perennial tussock grasses with a variety of herbs and forbs. Most of this habitat type is highly fragmented and degraded due to grazing and pasture modification. The groundlayer is frequently highly degraded and replaced by weeds. Less degraded remnants are often present in cemeteries, churchyards and travelling stock routes (Keith, 2004).

Broad Habitat Type - Forested Wetlands

This aligns with Eastern Riverine Forests (River Oak), Inland Riverine Forests (River Red Gum) described by Keith (2004). It includes the following vegetation types (DEC, 2008):

- BVT29 River Oak riparian woodland/forest of the slopes and tablelands – PCT84; and
- BVT River Red Gum riparian woodland/forest on floodplains – PCT36.

This BHT occurs on fertile alluvial mineral clays and sandy loams where it functions as a nutrient sink, absorbing nutrients deposited by floodwaters on riverine corridors and floodplains (Goldney et al, 2007). At rainfalls above 500 mm per annum the dominant species is the River Sheoak (*Casuarina cunninghamiana*), and below 500 mm River Red Gum (*Eucalyptus camaldulensis*) dominates.

River Sheoaks reach an average height of 40 m, and are accompanied by a shrub layer that is variable in composition and density, depending on altitude, latitude and stream characteristics (Goldney et al, 2007). Groundcover is generally patchy, with sedges, herbs and grasses dominating. In many parts of the Bathurst region this habitat type is degraded due to clearing, grazing, nutrient enrichment, weed infestation, and river regulation. Willows have had a major impact on the River Sheoak forests, and in many places the native understorey has been almost completely replaced by exotic species.

Conservation value of land parcels

Former Bathurst City LGA

The information in this section was derived from the Biodiversity Management Plan 2012 and updated through field inspections in 2017.

Very Good to Good Conservation Value

The areas with *good* conservation value:

- Mount Panorama including Albens Reserve, Hinxmans Vista and Mt Panorama Track Reserve, and Sulman Park;

- Boundary Road Reserve;
- Blayney Road Common
- Brooke Moore Reserve;
- Part of Hector Park; and
- The Bike Park between Vale and College Roads.

However, while the parcels tend to contain remnant patches of vegetation that could be rated as being *good* or *very good*, there are other areas within the parcel that devalue the overall condition rating. All these parcels contain significant remnants of the Box-Gum Woodland EEC or the locally restricted White Box (within the Box-Gum Woodland EEC) and the preliminary determination of the Tablelands Basalt Forest EEC (comprising a good groundcover composition) on Mount Panorama.

Moderate Conservation Value

There are a number of parcels of Council controlled land rated as having *moderate* conservation value and the majority of these run from the Mount Panorama precinct and thread northwards through the suburbs of Mitchell, West Bathurst, Windradyne and along Sawpit Creek. These parcels contain remnant stands of the Box-Gum Woodland and Tablelands Basalt EECs or are Box-Gum Woodland Derived Grasslands (albeit degraded in terms of structure, species composition or disturbance impact). Other parcels comprise a section of a waterway that although they may not be in good condition within the parcel provides an important conservation linkage in the urban landscape with weeds a dominant threat.

Poor to very Poor Conservation Value

Council controlled land is mostly *very poor* to *poor* and these include parcels of land similar to those with *degraded and highly degraded* ecosystem condition. Clearing of the native vegetation for agriculture as well as significant gullying of drainage reserves has resulted in a poor conservation base for urban development for the suburbs of Kelso, Raglan, Llanarth and Abercrombie.

Village and rural areas

There are some parcels in the villages and rural areas that were assessed with good or very good ecosystem condition ratings and conservation values. These include:

- Eusdale Recreation Reserve;
- Peel Operational Land;
- Wattle Flat Limekilns Road Crown Reserve;
- Tambaroora Racecourse Hill End;
- Trunkey Creek Crown Reserve;
- Lachlan Road Bushland Caloola;
- Hillview Reserve Napoleon Reef;
- Mount Tarana; and
- Winburndale Dam precinct.

Threats at these sites included weed invasion, lack of hollow bearing trees, localised severe erosion,

Areas of modified condition and moderate conservation values include:

- The Turon River reserves downstream of Sofala including the Oakey Creek campground and near Turondale at Coles Bridge;
- Wattle Flat racecourse;
- Pipers Creek reserve at Rockley;

- Cemeteries at Rockley Peel, Wattle Flat and Turondale;
- Trunkey Creek Resting Reserve;
- Mulgunnia Recreation Reserve;
- English Lane Reserve at Hill End;
- Hillview Reserve at Napoleon Reef; and
- Chifley Dam precinct.

The biodiversity assets at these sites were the presence of Box-Gum Woodland EECs and/or aquatic ecosystems. Weeds were a common threat in these areas and threats included recreational usage, grazing and erosion.

There were a number of other parcels rated with poor or very poor ecosystem condition or conservation value in the villages and rural areas. These land parcels were often small blocks that functioned as recreational parks, stockpile sites on a road reserve, rural fire sheds, vacant land and pump sites, etc. Threats included weed invasion, grazing, recreational use, lack of recruitment of native species, firewood collection and erosion.

Vegetation in Council Managed Reserves

Mactaggart (2012) documented a list of biodiversity assets on Council controlled land across the Bathurst Region including significant ecosystems:

b) Riparian ecosystems

- Macquarie River ecosystem from White Rock to Jubilee Park on Council controlled land;
- Lower Sawpit Creek riparian zone and its tributary to Colville Street (between the Mitchell Highway and the Macquarie River);
- Vale Creek riparian ecosystem – lower reaches and at Perthville;
- Jordan Creek riparian ecosystem at Hector Park;
- Hawthornden Creek – Boundary Road Reserve, between Havannah and Bant Street and Morcom's Reserve;
- Raglan Creek on the Macquarie River floodplain – Raglan Creek below Illumba Way to detention basin;
- Raglan Creek opposite the Scots School;
- Piper's Creek, Rockley village;
- Turon River (alongside Oakey Creek camping area and to the west of the village alongside);
- Trunkey Creek district, Trunkey village;
- Mulgunnia Creek;
- Campbells River and Chifley Dam precinct; and
- Winburndale Rivulet and Winburndale Dam precinct.

c) Box-Gum Woodland EECs

- Booth Street Reserve and surrounds;
- Sawpit Creek tributary, Llanarth;
- Brooke Moore Oval and surrounds;
- Blayney Road Common and Vietnam Veterans Park;
- Boundary Road Reserve and surrounds;
- Sulman and Reid Parks, Light Car Club track etc., Mount Panorama and surrounds;
- Area to the east of the waste management centre and south of College Road;
- Sofala - Oakey Creek campground hillslopes;
- Sally's Flat;
- Turon River Reserve;
- Chifley Dam precinct;
- Trunkey Creek road reserve; and
- White Box (as part of Box Gum Woodland EEC) between Barry Gurdon Drive and Mountain Straight.

d) Box-Gum Woodland EECs (derived grasslands)

- East of Citigate;

- South of the old picture theatre site;
- Parts of Sulman and Reid Parks;
- Inside track at the top of the Mount; and
- The old ‘dip’ site inside the racetrack.

e) Possible presence of the Tablelands Basalt Forest EEC

- Crest and upper slopes of Mount Panorama (Sulman and Reid Parks and inside the track); and
- Sir Joseph Banks Reserve.

f) High value woodland and forest ecosystems (urban and rural areas)

- Peel - open forests in old quarry site and road reserve on the eastern side of the entrance into the village;
- Wattle Flat racecourse;
- Oakey Creek camping area - River Sheoak riparian forest;
- Turon River Reserves - River Sheoak riparian forest;
- Mount Tarana crown reserve;
- Napoleon Reef;
- Trunkey Creek road reserve - Box Gum Woodland EEC and Apple Box-Ribbon Gum woodland (Mulgunnia Recreational Reserve);
- Trunkey Creek sports ground forested reserve; and
- Winburndale Dam.

g) Ponds and dams important for water birds and aquatic fauna

- Water filtration plant;
- Sewerage treatment plant;
- Council pound, dam at McDiarmid Reserve;
- Dam below waste management centre;
- Upper Raglan Creek dam below Mars Petcare; and
- Chifley Dam, Winburndale Dam.

h) Grasslands and derived native grasslands

- Potential native grasslands in Raglan are currently not documented.

Threatened Flora in Localities

Location	**Scientific Name**	**Common Name**	**NSW status**	**Comm. status**
Trunkey Creek	*Leucochrysum albicans var. tricolor*	Hoary Sunray		E
Perthville	*Lepidium hyssopifolium*	Aromatic Peppercress	E1	E
Abercrombie Karst Conservation Reserve	*Bossiaea fragrans*		E4A	
Lachlan Rd Caloola, Sunny Corner, Meadow Flat	*Eucalyptus aggregata*	Black Gum	V	V
Winburndale NR	*Eucalyptus cannonii*	Capertee Stringybark	V	
Rockley Mount Wattle Flat	*Eucalyptus pulverulenta*	Silver-leafed Gum	V	V
Sunny Corner	*Eucalyptus robertsonii subsp. hemisphaerica*	Robertson's Peppermint	V	V
Rock Forest	*Goodenia macbarronii*	Narrow Goodenia	E1	E
Rock Forest, Crackerjack Rock	*Zieria obcordata*		E1Source	E

Source: BioNet Atlas records of threatened plants listed on BC Act 2016 or EPBC Act 1999s in Bathurst Regional LGA recorded since 01 Jan 1990.

Biodiversity Assets INFFER Database

Biodiversity assets were identified as part of the IFFER database (Central West CMA, 2010) and included:

- *Zieria obcordata* population at Rock Forest/Crackerjack Rock;
- Swampy meadows at Hopes waterhole, Brisbane Valley Creek, Rockley; Native Dog Creek tributary, Rockley; Mooney Swamp Creek, Dunkeld/Fremantle; Sandy Swamp, Fremantle; Diamond Swamp Creek, Kirkconnell; Wattle Flat Swampy Meadow, Limekilns Rd, Wattle Flat; Upper Georges Plains Creek, Newbridge;
- Five frog species (Green and Golden Bell Frog, Yellow Spotted Bell Frog, Southern Bell Frog, Booroolong Frog and Bibrons Toadlet) in the Central West;
- Aromatic Peppercress off Hen & Chicken Lane, Perthville;
- Purple Copper Butterfly habitat on private property and council land;
- Raglan Creek floodplain and wetlands, Kelso (on Simplot farm);
- Silver leaved Gum (*Eucalyptus pulverulenta*) populations at Rockley Mount;
- Abercrombie Caves, Abercrombie National Park;
- Winburndale remnant vegetation, Winburndale Nature Reserve;
- Ben Chifley Dam, The Lagoon;
- Hill End Box-Gum Woodland;
- Koala population at Rockley Mount;
- Winburndale Rivulet, and Winburndale Dam;
- Macquarie River downstream of Bathurst (in particular, downstream from Eglinton);
- Bathurst Plains natural grassland, Brewongle/Raglan;
- Bell Falls, Wattle Flat;
- Wambool Nature Reserve, Wambool;
- Fish River, Flat Rock via O'Connell;
- Kelloshiel Creek, Mt Rankin;
- Basaltic soils, Mount Panorama cap and Stewart's Mount;
- Alluvial soils along Campbells River;
- Limestone Karst, Limekilns;
- Peel Common, Peel;
- Brooke Moore Reserve, Bathurst;
- Willow Tree Lane, Mt Rankin;
- Upper Sawpit Creek Woodland (on private land);
- Remnant native vegetation, Eusdale Rd, Yetholme;
- Macquarie River urban reaches;
- Remnant vegetation, Wattle Flat Heritage Lands, Wattle Flat;
- White Box Woodland, western side of Mount Panorama;
- Winburndale – Clear Creek corridor, north of Bathurst;
- Turon River Heritage Lands, Bridle Track, Turondale/Hill End;

- Creeklines on Omya mine site, once swampy meadows, with *Callistemon sieberi* (River Bottlebrush);
- Bathurst granites of the Bathurst batholith, source of granitic soils;
- Tableland Basalt Forest EEC, Bathurst-Oberon district;
- White Box-Yellow Box-Blakely's Red Gum Woodland EEC, as mapped;
- Boundary Road Reserve, Bathurst;
- Mount Rankin Reserve, Mount Rankin;
- Copperhania Nature Reserve, Trunkey Creek; and
- Box-Gum Woodland EEC, Trunkey Creek.

Relevant Threatened Species Recovery Plans

Family	Scientific Name	Common Name	Recovery Plan
Brassicaceae	*Lepidium hyssopifolium*	Aromatic Peppercress	Recovery Plan: http://www.environment.gov.au/resource/national-recovery-plan-basalt-peppercress-lepidium-hyssopifolium In effect under the EPBC Act from 13-Aug-2010.
Proteaceae	*Zieria obcordata*		Recovery Plan: http://www.environment.gov.au/resource/zieria-obcordata In effect under the EPBC Act from 23-Oct-2008.