



CERAP

Strathewen Catchment • November 2012

*community environmental recovery action plan*

CERAP



Strathewen Catchment

# CERAP

## What is a cerap?

The Strathewen Community Environmental Recovery Action Plan is a package of documents developed with the Strathewen community that identifies actions to care for and manage the environmental and agricultural values of Strathewen.

The Strathewen CERAP has drawn upon many different sources of information (Nillumbik CERAP Literature Review 2011). The findings were then presented to the Strathewen community over two workshops in May 2011 to determine the community's vision for land management in Strathewen and their priorities.

### The CERAP consists of:

- **The Nillumbik CERAP Literature Review 2011** – this provides details on the wide range of information sources that were used to prepare this CERAP (and the two other CERAPs for St Andrews and Christmas Hills).
- **The Community Environmental Recovery Action Plan (CERAP) –Strathewen Catchment – July 2012** – this is the main CERAP document and contains the detailed descriptions of:
  - the Strathewen area (e.g. climate, geology, topography, land use history, waterways and biodiversity)
  - the environmental and agricultural values of Strathewen and the key threats
  - the actions needed to protect and enhance these values
  - examples of community-based projects that could be undertaken.
- **The Strathewen Community Environmental Recovery Action Plan Map** – this map depicts the three main land management zones in Strathewen and identifies the types of actions landholders in each zone can do to help care for and manage the environmental and agricultural values of Strathewen.
- **The CERAP Fact Sheets** – this is a series of updateable information sheets that provide more detail on various specific aspects of land management. Fact sheets in the series at the time of printing include:
  - Managing bush blocks
  - Dams and waterways
  - Weed mapping and monitoring
  - Erosion
  - Native fauna in Nillumbik
  - Land classes - Christmas Hills
  - Land classes - St Andrews
  - Land classes - Strathewen
  - Landcare
  - Legal responsibilities for weeds and pest animals
  - Controlling pest animals
  - Property management planning
  - Revegetation
  - Weed control.

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**Community Environmental Recovery Action Plan Steering Committee** members:

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Sue Aldred, St Andrews Landcare  
Donna Stoddart, Nillumbik Shire Council

Past and present members of the **Natural Environment Recovery Working Group:**

Landcare  
St Andrews Landcare  
Arthurs Creek and District Landcare  
Christmas Hills Landcare  
Strathewen Landcare

Community Recovery Committees:

St Andrews Community Recovery Committee  
Strathewen Community Renewal Association  
Christmas Hills community

Nillumbik Shire Council  
Environmental Planning Unit  
Environmental Works Unit  
Infrastructure Maintenance Unit  
Bushfire Recovery Support Unit

St Mathew's Parish  
Country Fire Authority  
Parks Victoria  
Port Phillip and Westernport Catchment Management Authority  
Melbourne Water  
VBAF Environment Recovery team

All community members who attended CERAP workshops, hosted site visits and provided feedback on draft plans.

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Every effort made to ensure referencing of this document.

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Photo by Celeste Geer

# 1. Executive Summary

This Community Environmental Recovery Action Plan (CERAP) for Strathewen provides a vision, goals and actions to guide sustainable management of the Strathewen catchment over the next five years. It is intended to be a document for use by the community and covers important issues for catchment management in Strathewen. It includes appropriate activities to be undertaken by residents individually and in conjunction with other land managers; for instance, your neighbours, Nillumbik Shire Council and Melbourne Water. A careful read will reveal just how precious our local landscape is and how we can protect it for the future.

The vision for the CERAP, developed in consultation with the community, is:

“A vibrant cohesive community in Strathewen working together, sharing, learning and helping each other, with the natural environment and green wedge retained, flora and fauna enhanced, and bush and wildlife appreciated.”

The goals which have been identified by the community to fulfil this vision are:

SUBJECT	GOALS
Agriculture	To encourage adoption of 'best' practices in all agricultural landscapes. To identify sustainable agricultural enterprises for the future.
Waterway health	To manage the catchment for protection and improvement of water quality.
Biodiversity	To protect and enhance native vegetation and fauna populations. To secure important biolinks by protecting and enhancing remnant native vegetation and linking core areas.
Rural living	To encourage adoption of sustainable land management practices. To encourage protection and enhancement of biodiversity values.

A number of key challenges to catchment management in Strathewen have been identified. These include continuing changes to rural development, the need to maintain ecological values, problems with pest plants and animals, climate change and fire. In particular, the February 2009 bushfires adversely affected the Strathewen catchment, causing loss of human lives and substantial damage to agriculture, native flora and fauna and infrastructure.

The CERAP contains a range of specific actions for landholders under the categories mentioned above; namely Agriculture, Waterway health, Biodiversity and Rural living. It also contains some potential projects that may be activated by a lead organisation such as Landcare and for which funding may be sought.

Community-building and capacity-building activities primarily fall under the responsibility of community groups and Nillumbik Shire Council. These are key to the

successful implementation of the plan. Such activities are aimed at involving and engaging subsets of landholders such as farmers, immediate neighbours and owners of bush blocks who all have similar land management goals.

In addition to this Plan, the following resources have been developed to assist you in taking positive action to protect and enhance your property. These resources include:

- a series on best practice factsheets providing detailed information of weeds, pest animals, native fauna, waterways, erosion and agriculture
- a catchment map summarising the environmental values, agricultural values, significant threats and what can be done to help.

## 2. Introduction

This Community Environmental Recovery Action Plan (CERAP) identifies long term goals and actions to engage the community in the environmental recovery of the Strathewen catchment over the next five years. The goals and actions relate to agricultural areas, bushland and waterways that were adversely affected by the February 2009 bushfires.

The CERAP has been developed in consultation with the Strathewen Landcare Group and interested members of the community through community workshops and other stakeholder consultations. The catchment boundary for the CERAP was determined by the Strathewen community. The CERAP is a living document, intended for easy revision and updating to provide ongoing direction for achieving its goals. The implementation of actions by individuals is voluntary. The Plan is meant to be used as a guide for prioritising actions both for you to take on **your property** and for you to contribute to within **your community**.

The CERAP is informed by the *Nillumbik CERAP Literature Review* (2011), which identifies and reviews existing documentation including legislation; federal, state and regional policy; municipal strategies and plans; and local information. For those implementing the CERAP, easy access to information is also provided by best practice factsheets and the Strathewen Catchment summary map. These have been prepared in conjunction with the CERAP and are available on the [Strathewen Landcare](#) and [Shire of Nillumbik websites](#).



Photo by Celeste Geer

### 2.1 Vision, principles and goals

The vision underpinning the CERAP is:

'A vibrant cohesive community in Strathewen working together, sharing, learning and helping each other, with the natural environment and green wedge retained, flora and fauna enhanced, and bush and wildlife appreciated.'

Implementation of the actions and potential projects included in the CERAP will ensure that the vision is realised.

Management of the Strathewen catchment will be shaped by six guiding principles, now and into the future



#### Principle 1: Community awareness

Members of the Strathewen community understand and value good land management. They understand its importance and are willing to invest and actively participate in actions that result in good land management.

#### Principle 2: Extension and technical support

The Strathewen community has access to technical support through a variety of local, regional and state resources and expertise.

#### Principle 3: Incentives

Incentives are provided and promoted to encourage cost-sharing arrangements that support research and on-ground works that have a public and private benefit.

#### Principle 4: On-ground works

The implementation of the CERAP will provide coordinated and effective on-ground projects that demonstrate sustainable land management and conservation.

#### Principle 5: Coordination

The Strathewen community works in partnership with Nillumbik Shire Council and other stakeholders towards a healthy, resilient, productive community and landscape.

#### Principle 6: Research and investigation

Essential and locally relevant land management knowledge is compiled, accessible and used to make good decisions in programs, investment, standards and planning.

The following goals were established in community workshops conducted in 2011.

**Table 1:** Goals for the Strathewen CERAP

SUBJECT	GOALS
Agriculture	To encourage adoption of 'best' practices in all agricultural landscapes. To identify sustainable agricultural enterprises for the future.
Waterway health	To manage the catchment for protection and improvement of water quality.
Biodiversity	To protect and enhance native vegetation and fauna populations. To secure important biolinks by protecting and enhancing remnant native vegetation and linking core areas.
Rural living	To encourage adoption of sustainable land management practices. To encourage protection and enhancement of biodiversity values.

The CERAP will provide justification and supporting documentation for requests to external organisations for funding and other support. Projects will require commitment from a lead organisation, a project management team and people from the community, as well as agencies. This will provide a combination of local knowledge, experience, technical knowledge and skills.

Most importantly, this CERAP should inspire and assist the community to undertake both individual and collaborative action.

## 2.2 History of land use

Prior to European settlement, Aboriginals from the Wurunjeriwillam clan roamed the area, moving frequently in order to survive. Little is known about them although evidence of their former activities occasionally appears in the form of stone implements and 'scar' trees.

Europeans first explored the Upper Arthurs Creek area in the late 1830s and soon after timber cutting began. This clearing of the land made way for the arrival of freehold settlers in the 1860s with the land made available for selection and clearing.

The river flats were used for dairying and together with the well-drained slopes of coarse soils, were particularly suitable for fruit growing. Many commercial orchards were established along the Arthurs and Chadds Creeks and the area became part of Melbourne's north eastern 'fruit bowl'.

In 1897, residents raised a petition to establish a post office in what was still referred to as the Upper Arthurs Creek area. The name chosen was Strathewen meaning 'the broad mountain valley of Ewen' after the local Member of Parliament Ewen Hugh Cameron MLA. The community hall was opened in 1902 and the school in 1914.

The extension of the railway from Eltham to Hurstbridge took place in 1912, largely as a result of the success of the fruit industry in the district. The railway was also used to take fruit and furnace wood to Melbourne and soon attracted large numbers of picnickers and day trippers from Melbourne. A number of guest houses were established in Strathewen.

The Kinglake forests sustained an active timber industry until the gazettal of 5,587 hectares as a National Park in 1928. The area of the Park was substantially enlarged in 1980 to 10,300 hectares. There is a close connection between the Strathewen valley and the enfolding Kinglake ranges, particularly Mount Sugarloaf. Many people move to the area to enjoy and promote the conservation values of bush blocks.

In the cleared areas, part-time and hobby farmers predominate. The present zoning provisions generally act to prevent further subdivision and help maintain the rural character of the area. Favoured enterprises are beef cattle, apples, pears, lemons and wine grapes. Horses and motor bikes remain the major lifestyle drawcards for families. A recent phenomenon is the interest in exploring alternative agricultural enterprises which have specialty niche markets.



Since the 1980s these have included garlic, emus, buffalo and, more recently, alpacas.

Fires are part of the history of the Strathewen area and three major fires have occurred in recent memory. These were the January fires in 1939 when the whole area was completely burnt out, January 1962, when fire burnt through Kinglake National Park to Strathewen and south to Warrandyte and February 2009 when Strathewen was devastated by the Black Saturday bushfires.

In the months following Black Saturday, despite a very emotive atmosphere concerning vegetation management issues, the aggregated community responses to the Strathewen Community Renewal Association visioning workshops put love for the valley and our natural bush environment as the highest priority. This Plan puts a practical and technical framework around this community aspiration to repair and care for the beautiful place where we all live.

*In the cleared areas, part-time and hobby farmers predominate. The present zoning provisions generally act to prevent further subdivision and help maintain the rural character of the area. Favoured enterprises are beef cattle, apples, pears, lemons and wine grapes.*

It is now 2012 and the Strathewen community continues the process of renewal. The school, community-owned hall and sports pavilion have all been rebuilt. New lemon orchards have been planted; horses, cattle and other livestock are returning to re-fenced paddocks. Erosion, dam silting, dangerous trees and weed infestations present major problems for landholders. The vigour and beauty of the natural regeneration processes are both challenging and wondrous.

*Acknowledgements: Bruce G. Draper 15 December 2005, Nan Oates 'Strathewen Landcare Catchment Management Plan' 1995*

## 2.3 Existing land use

About half of the properties in the catchment are used for rural living on small properties of cleared or partly cleared land or bush properties of up to 10 hectares. On these smaller properties, cleared land is generally grazed by horses or cattle, with conservation use on bush blocks. Agricultural holdings of over 10 hectares generally support enterprises such as orchards, vineyards or beef cattle production.

The pattern of settlement and development results in there being few large commercial-scale agricultural holdings. The

slope and soil characteristics of the Strathewen landscape generally preclude intensive agriculture.

Most properties have resident owners. However, there is also a significant number of absentee owners.

### Property statistics

The data in **Table 2** below show the spatial distribution of the separate properties in the catchment. There may be single ownership of more than one property.

**Table 2:** Property size profile for the Strathewen catchment area

Strathewen	Up to 0.4 ha	> 0.4 ha to 1 ha	>1 to 4 ha	>4 to 10 ha	>10 to 40 ha	>40 to 100 ha	>100 to 400 ha	Total
No. properties (%)	9 (6%)	9 (6%)	15 (10%)	29 (18%)	63 (40%)	29 (18%)	3 (2%)	157
AREA (%)	2 ha (0.1%)	6 ha (0.2%)	31 ha (0.8%)	201 ha (5.2%)	1,512 ha (39.0%)	1570 ha (40.5%)	554 ha (14.3%)	3,875 ha

Source: Nillumbik Shire Council, 2010



Photo by Kylie Woods

## 3. Catchment Description

A catchment is an area of land that collects water, which drains to the lowest point in that area.

Rain falling on the land will make its way to the lowest point, via groundwater, aquifers, creeks, dams, lakes, rivers, wetlands or stormwater systems.

Together with rivers, creeks, lakes and dams, a catchment includes groundwater, stormwater, wastewater and water-related infrastructure. Catchments are connected from top to bottom, so what happens upstream in a catchment has a large influence further down the catchment.

Human activities across a whole catchment, such as pollution, soil erosion and the spread of weeds, can adversely affect the quality of water and the environment at the bottom of the catchment. This is why it is important to manage a catchment as a whole rather than in parts.

## 3.1 Strathewen catchment area

The Strathewen catchment comprises the two main valleys of Arthurs and Chadds Creeks and the narrow valleys of their several tributaries, including the Strathewen Reserve Tributary. A small area of the catchment, in the south-west, flows into Running Creek. These valleys are surrounded by predominantly low hills through the central part of the catchment that merge with long ridges of steep hills and rugged terrain particularly on the northern and eastern boundaries. Much of the steep land remains in forest, while most of the low hills and flats have been cleared for agriculture.

## 3.2 Climate

Between December and February, maximum daily temperatures in Strathewen average between 23° C and 26° C but can soar above 40° C, especially when hot conditions prevail across the state. Between June and August, maximum daily temperatures average between 10° C and 14° C, but they can occasionally drop below 0° C, causing frost. The average annual rainfall is approximately 950 mm. Low temperatures tend to limit growth in winter and lower rainfall limits growth in the summer months.



This landscape has a high erosion hazard due to the hard-setting surfaces, which tend to increase run-off, and the dispersible nature of clay subsoils.

## 3.3 Geology and soils

The geology of the Strathewen catchment is very old sedimentary rock. The soils of the low hills are light-textured yellow, brown or red duplex. Shallow light-textured gradational soils occur on the crests and steeper slopes. Grey clay of uniform profile occurs along drainage lines and floodplain. This landscape has a high erosion hazard due to the hard-setting surfaces, which tend to increase run-off, and the dispersible nature of clay subsoils. Sheet, gully and tunnel erosion occur on sloping land, with tunnel erosion generally only in cleared areas. Where drainage lines are denuded of protective vegetation, erosion of the bed and banks is occurring.

## 3.4 Topography

The aerial photo in **Figure 1** shows the physiographic features of the Strathewen catchment including topography, aspect, cleared land and bushland. Ridgelines and valleys are visible. The brownish grey areas are bushland, the light green areas are generally cleared land with northerly and westerly slope aspects, and the dark green areas are cleared land, predominantly with southerly and easterly slope aspects. Managing for slope aspect is particularly important for pastures on grazing properties, some horticultural crops and in planning to manage the risk of bushfires..

## 3.5 Waterways

The Strathewen catchment includes the upper reaches of Arthurs Creek and Chadds Creek and the narrow valleys of their tributaries, including the Strathewen Reserve Tributary. A small area of the catchment in the south west flows into Running Creek.

Melbourne Water describes the upper reaches of Arthurs Creek as being in good condition. The presence of and potential spread of weeds is identified as the major risk to the headwater reaches

## 3.6 Native vegetation cover

The Strathewen catchment supports large areas of relatively intact native vegetation providing habitat for an abundance of significant and unique flora and fauna. The catchment also supports areas of cleared land used for agricultural purposes with scattered native trees. Diamond Creek and its tributaries also provide ecological values.

Indigenous eucalypt vegetation is tightly linked to soil and land type:

- the well-drained, exposed areas such as crests and slopes contain woodland with Long-leaf Box (*Eucalyptus goniacalyx*), Red Box (*E. polyanthemos*), Messmate (*E. obliqua*), Red Stringybark (*E. macrorhyncha*) and Narrow-leaf Peppermint (*E. radiata*)
- the lower slopes support mainly Yellow Box (*E. melliodora*)
- the drainage lines support mainly Candlebark Gum (*E. rubida*), and Manna Gum (*E. viminalis*)
- small patches of open forest, usually on older soils, support Red Ironbark (*E. tricarpa*)

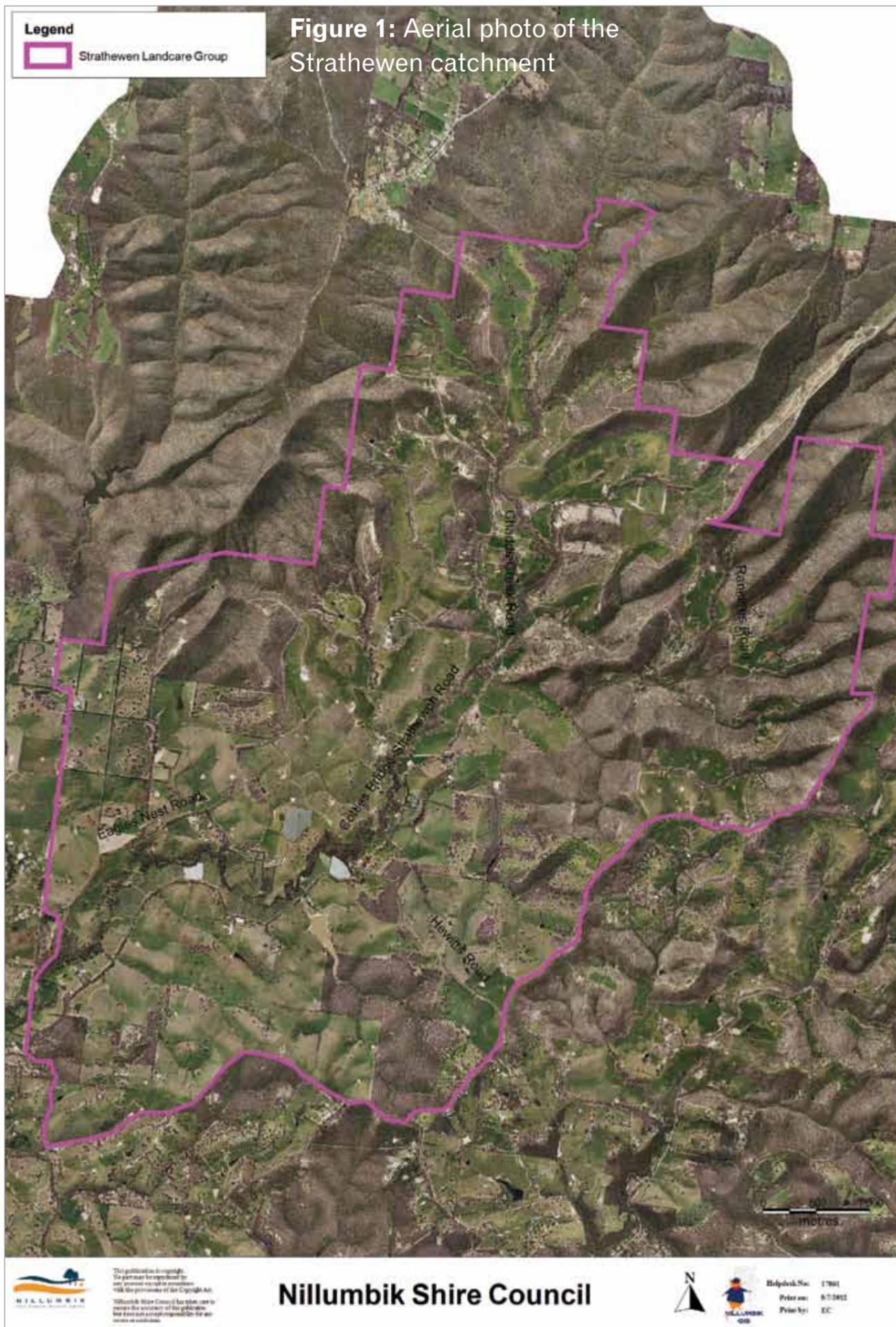
Non-eucalypt plant species are also strongly associated with particular land types including Blackwood (*Acacia melanoxylon*), Silver Wattle (*Acacia dealbata*), Sweet Bursaria (*Bursaria spinosa*), Tree Everlasting (*Ozothamnus ferrugineus*) and Common Heath (*Epacris impressa*).

An excellent text for understanding these patterns is *Native Trees and Shrubs of South-Eastern Australia* (6th ed. 2009) by Leon Costermans.

The Strathewen catchment supports large areas of relatively intact native vegetation...



Photo by Celeste Geer



## 4. Agricultural Land Capability

Assessing land capability or 'land class' allows us to gauge the inherent risks and opportunities for our land to provide for and sustain our current and/or proposed land uses. Land capability varies according to the geology, soil type, topography, aspect and climate.

In general terms, land with a high capability rating (e.g. land class 1), will be more suitable to being modified for agricultural use.

### 4.1. Land management units

Land Management Units (LMUs) provide us with a means for systematic review of land characteristics and are broad measures of land capability. The aggregation of lands with common characteristics into LMUs provides us with a general indication of the capacity of our land to sustain various land uses.

The five LMUs can be identified in the Strathewen catchment as follows:

- Floodplain LMU: Very gently sloping to flat land with gradient <1% - 3%
- Gently undulating LMU: Gradient 3% - 15%
- Moderately undulating LMU: Gradient 15% - 25%
- Steep LMU: Gradient 25% - 35%
- Rugged terrain LMU: Gradient 35% - >40%.

The location of each LMU is identified in **Figure 2**.

The hilly landscape and soil type of the Strathewen catchment facilitates a significant erosion hazard. Specifically:

- all sloping land has high to moderate hazard for sheet, gully and tunnel erosion
- the steeper slopes have a moderate to high hazard for mass movement (land slips)
- all streamlines have a high hazard for streambed and bank erosion and sedimentation.

## 4.2 Agricultural land quality

This section expresses the degree of agricultural versatility and production potential across the Strathewen catchment in terms of five classes of agricultural land quality. It is important to note that this only provides a broad guide and should not be used to justify significant changes in land use.

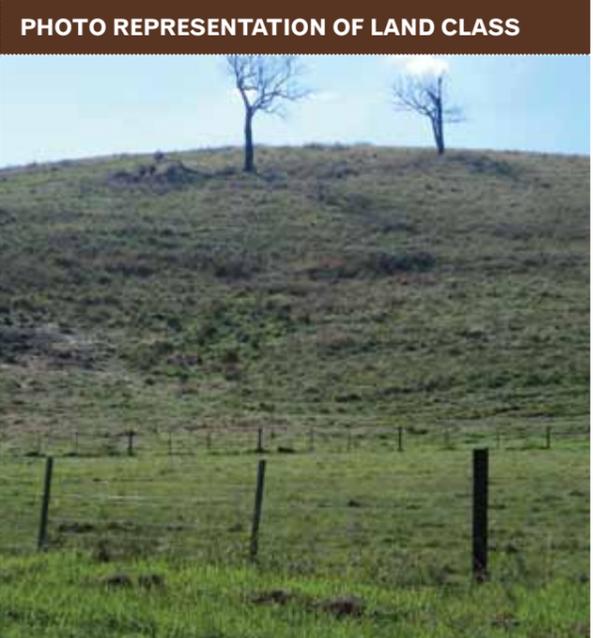
Prior to undertaking any significant change to land use, or if you have only recently purchased your land, it is strongly recommended that you prepare a detailed land capability assessment of your land. This is best achieved

as a component of a detailed 'Property Management Plan' (sometimes referred to as a 'Whole Farm Plan'). Council can assist landholders with the preparation of such plans.

**Table 3** presents a five-class description of agricultural land quality across the Strathewen catchment and the map at **Figure 3** depicts a broad spatial interpretation of this information. This mapping is largely based on slope classes and hence does not incorporate important components of land capability such as local hazards (e.g. known tunnel erosion), variation in remnant vegetation cover, aspect, soil type, soil moisture and the presence of minor drainage lines.

**Table 3:** Land class descriptions for Strathewen catchment

LAND CLASS	EXPLANATION	PHOTO REPRESENTATION OF LAND CLASS
<b>Class 1</b> <b>Very high</b>	<p>Agriculturally versatile land, with high inherent productive potential through possessing deep permeable, friable, structurally resilient and fertile soils, a flat to gently undulating land form, and an annual growing season of up to 11 to 12 months either under natural rainfall or through the availability of irrigation. Suitable for intensive irrigated cropping and grazing.</p>	
<b>Class 2</b> <b>High</b>	<p>Agriculturally versatile land but requiring a higher level of inputs to achieve the same productivity as Class 1. Slope is greater, soils more variable, and the growing season is limited to 9 to 10 months, or extended to 12 months if irrigation water is available. Suitable for high production extensive cropping and grazing and irrigation.</p>	

LAND CLASS	EXPLANATION	PHOTO REPRESENTATION OF LAND CLASS
<b>Class 3</b> <b>Moderate</b>	<p>Land capable of supporting grazing but limited in versatility. Generally unsuited to cropping either because of limitations due to slope, drainage, lack of topsoil depth, weaker structure, water-holding capacity or presence of rock. Fertility levels are moderate to low, and annual growing season can be limited to approximately 7 to 8 months due to dryness or wetness. With high inputs, moderate to high animal production may be achieved.</p>	
<b>Class 4</b> <b>Low</b>	<p>Land capable of supporting grazing under moderate to low stocking rates, but only in situations where legally cleared paddocks exist. Slopes are moderate to steep, with shallow infertile soils that need care in their management. Fertility levels are generally low. High inputs may not be economic. Erosion hazard is high. Forest is often the best and most stable form of land use. Removal of remnant indigenous vegetation must be avoided.</p>	
<b>Class 5</b> <b>Very low</b>	<p>Land unsuited to agriculture. Constraints may be steepness of slope, existing indigenous vegetation, shallow, sandy or rocky soils, and high erosion susceptibility. Environmental stability may be best achieved through isolating areas and strictly controlling or eliminating agricultural land uses. Removal of remnant indigenous vegetation must be avoided.</p>	

## 4.3 Agricultural case study

# Feeding and breeding are the keys to success on a beef cattle farm

A case study with Barrie and Rae Tully, Strathewen

Barrie and Rae Tully graze beef cattle on their 100 hectare farm in O'Deas Road. The property was purchased 50 years ago as an extension to their Doncaster orchard and cool store. In 1983 when the suburbs reached them, they moved to Strathewen with their young family.

Until eight years ago Barrie and Rae operated a mixed orchard of 30 hectares on their Strathewen property as their main business. Then they decided on a business and lifestyle change. In 2003, they discontinued orcharding and began their Angus beef breeding and fattening enterprise.

They coped with the recent long drought, and up until the 2009 fires they had built their herd to 100 head, including 60 cows. The fire severely damaged their house, and they lost 12 head of cattle, 90 percent of fencing (14 kilometres), sheds, stockyards and most farm machinery – and most of the pastures were burnt, including one kilometre of windbreak/shelterbelt trees. Faced with no pasture, ineffective fencing and cows beginning to calve, Barrie made the decision to sell all his surviving cattle and put all his effort into re-establishing the farm infrastructure, which is now complete.

Importantly the Tully's were insured, but Barrie chose to rebuild the fences himself with help from CFA and VFF volunteers who built the boundary fences. He ruptured a tendon during the fire, so a contractor was used to replace some corner posts. Barrie observed that the surviving fences were in fencelines previously sprayed with Roundup. This was an important lesson, and he now sprays most fencelines annually.

In the meantime he also purchased a further 50 cattle and a bull and intends to increase the herd to the former 100 head in the near future. Barrie says he wants to produce as much as he can from the land and judges that the property remains well understocked. He intends to purchase more cows when prices moderate in the autumn of 2012, to bring numbers back up to about 70 cows.

To avoid over-capitalisation he decided not to replace all destroyed machinery but to use contractors for such

operations as hay production and fertiliser spreading.

Pasture has not been improved since the fire, but the last two years have seen good rainfall and prolific pasture growth. Most pastures contain a perennial grass base that can include Cocksfoot, Perennial Ryegrass or Phalaris, with White and Subterranean Clovers. Hill pastures tend to contain a high proportion of annual grasses and the lower slopes and flats more perennial grass.

The main pasture weed is Bent grass, which competes strongly with pasture species, particularly when soil fertility is low. Barrie says, "There are three ways to deal with Bent grass; maintaining a strong vigorous pasture, over-sowing with pasture grasses and clover, or if the situation is very bad, spray out the area and re-seed with pasture species. Where we have the problem, we intend to over-sow some areas and re-seed others." He says, "We don't worry too much about annual pasture weeds such as Cape Weed. Grazing management keeps them under control."

Blackberry is a serious weed on the property. Barrie says, "Before the fire Blackberry were virtually under control, and now young bushes are everywhere, particularly along sprayed fencelines and the creek, so I spend a lot of time spot spraying Blackberry at the moment." He also commented that the main pest animals are wild ducks and kangaroos. "They do more damage to pasture than rabbits, which are not a big issue on this property."

Barrie tests the soil and has regularly fertilised pastures with phosphorus, potassium and molybdenum to a point where fertility levels now only require maintenance fertilising. Barrie also applies lime to counter soil acidity. Testing showed that soils were very acidic and reducing pasture growth. He believes his orcharding background taught him the importance of proper plant nutrition in achieving high production pastures. He says, "Growing grass is much cheaper than making hay." When he does make hay, he applies urea in September to the locked up paddocks to maximise production. He says, "It's worth it. We get a 33 per cent increase in hay yield from applying nitrogen fertiliser."

Water supply is plentiful with two large dams of 18 and 14 megalitres built during orcharding days. The dams supply all stock and garden water, which is gravity-fed by pipelines to troughs in most paddocks and the garden.

The property comprises four of the Strathewen Land Management Units, including Gently Undulating Land of high agricultural quality, Floodplain of moderate agricultural quality, Moderately Undulating Land of moderate agricultural quality and Steep Land of low agricultural quality.

The steep land and creekline remain in native bush and are fenced from the grazing land. Barrie rotationally grazes all paddocks to maximise pasture productivity according to the capability of the land. To facilitate rotational grazing and pasture management, all 11 paddocks on the property are fenced along Land Management Unit boundaries. Barrie said, "We are very careful about our stocking rates and do not overstock. We would rather understock than have too many cattle."

Barrie considers land conservation as a management priority. He said, "Soil erosion was very serious after the fires and the best way to control it was to grow grass for ground cover. Our creek is fenced under the Melbourne Water Stream Frontage Management Program and the creekline is in good condition despite the fire and flood of 2009."

Barrie said, "We have had great success running cattle. We do it by the book. Feeding and breeding are the keys to success. We grow the right pastures with the right species and fertilise them. Our cattle are well-bred and well-fed with a balanced and sufficient diet of pasture and hay." Barrie always buys well-bred cattle. He considers the better genetics offers the greatest rate of weight gain. And he believes that "top quality stock in the market always impresses the buyer."



Photo by Barrie Tully



Photo by Barrie Tully



Photo by Barrie Tully



Photo by Barrie Tully

# 5. Ecological Values

Ecological values are generally defined as the benefits that space, water, minerals, flora and fauna and other aspects of natural ecosystems provide for native life forms.

The Strathewen area is within the Highlands Southern Fall Bioregion. Bioregions are relatively large land areas characterised by broad landscape-scale natural features – hills, valleys, creeks and vegetation – as well as the environmental processes that influence them. These environmental and ecological processes include climate, geomorphology, geology, soils and vegetation. Bioregions are used as the broad scale mapping units for biodiversity planning in Victoria, adopted under Victoria’s 1997 Biodiversity Strategy.

The Highlands Southern Fall Bioregion is the southerly aspect of the Great Dividing Range and is predominantly hilly, with geology of largely sedimentary rock with shallow stony soils and yellow duplex soils.

Significant plant (flora) and animal (fauna) records within the Strathewen catchment are detailed in **Appendix 1**. Plants and animals can be listed as being of national or state significance. This may mean that the population of the species is poorly known or, rare or threatened with extinction. One nationally significant fauna species, Growling Grass Frog (*Litoria reniformis*), and 23 state significant fauna species, including Brush-tailed Phascogale (*Phascogale tapoatafa tapoatafa*), have been recorded in the area.

No nationally significant flora species have been formally recorded although the area supports potential habitat for nationally significant species. Three state significant species, Creeping Grevillea *Grevillea repens*, Large-leaf Cinnamon Wattle *Acacia leprosa* (large phyllode variant) and Southern Varnish Wattle *Acacia verniciflua* (southern variant) have been recorded in the area and the area has the potential to support numerous significant flora species.

The locations of these species are held in the DSE databases in the Victorian Biodiversity Atlas (see <http://www.giconnections.vic.gov.au/content/vicgdd/record/ANZVI0803004161.htm>). It is worth noting that significant

species records need to be treated with caution; sometimes survey efforts across the area are not known. It is also highly likely that additional survey efforts would reveal additional significant species.

## **The North East Regional Organisation of Councils (NEROC) Report**

In 1997, the former North East Regional Organisation of Councils (NEROC) published a report on significant fauna sites and habitats for north-east Melbourne. The NEROC Report, written by local field ecologist Cam Beardsall, provides a comprehensive description of sites of faunal significance and the species of native animals that require conservation management. The document also maps important fauna conservation sites (NEROC sites) and provides recommendations to conserve fauna habitat across the region. While five NEROC sites of significance cover parts of the Strathewen catchment, most of the area is covered by three sites: NUH B82, NUH B83 and NUH B84. These are considered part of the Nillumbik Upland Hills (NUH) NEROC biophysical zone. The northern tip of the area covers the Kinglake Ranges (KR) biophysical zone and includes NEROC site KRB. At the south-east corner of the area is the Nillumbik Lowland Hills. The habitat and faunal significance of the sites is detailed in **Table 4**. A map showing the location of the sites in the Strathewen catchment is shown in **Figure 4**.

**Table 4:** NEROC sites of significance within the Strathewen catchment

SITE	HABITAT SIGNIFICANCE	FAUNAL SIGNIFICANCE	THREATENED FAUNA SPECIES IDENTIFIED
<b>NUH C85 (Arthurs Creek Upper Reaches)</b>	Medium	Medium/Regional	Tree Goanna, Freshwater Blackfish, Broad-finned and Mountain Galaxia, Azure Kingfisher, Black-eared Cuckoo
<b>NUH C86 (Chadds Creek)</b>	High	High/State	Masked Owl, Barking Owl, Powerful Owl, Common Dunnart, Tree Goanna, Mountain Galaxia, Brush-tailed Phascogale
<b>NUH C87 (Hewitts Road)</b>	High	High/State	Barking Owl, Brush-tailed Phascogale, Tree Goanna, Growling Grass Frog, Bibron’s Toadlet
<b>PUH A88 (Deep Creek – Running Creek)</b>	Medium	Medium/Regional	Mountain Galaxia, Freshwater Blackfish, Growling Grass Frog
<b>NLH A65 (Arthurs Creek to Strathewen)</b>	Medium	Medium/Regional	Swift Parrot, Freshwater Blackfish, Bibron’s Toadlet

Source: NEROC Report

## 5.1 Ecological vegetation classes

All vegetation – trees, shrubs, grasses and flowers – in an area or catchment can be categorised into Ecological Vegetation Classes (EVCs). In Strathewen, EVCs are an important complement to the ecological descriptions and mapping contained in the NEROC findings and the Environmental Significance Overlays.

EVCs represent different vegetation communities and are identified and mapped across Victoria by DSE. They are a valuable tool in biodiversity planning and conservation assessment. EVCs help to give us a better understanding of our landscape: why it looks the way it does, and why certain plants grow in certain areas. DSE provides two sets of EVC mapping: Pre-1750 EVC mapping, and 2005 EVC mapping.

- Pre-1750 mapping identifies the estimated extent of vegetation (EVCs) that occurred in Victoria prior to European settlement. It is a modeled dataset based on field data, soils, rainfall, topography and historical records.
- 2005 mapping identifies the current extent of native vegetation and EVCs and their decline since 1750.

The pre-1750 mapping identifies six EVCs in the Strathewen catchment (**Figure 5**). The 2005 DSE mapping identifies that while these EVCs are all still present their distribution is reduced (**Figure 6**).

Remnant vegetation within Strathewen is dominated by three EVCs, Herb-rich Foothill Forest, Grassy Dry Forest and Valley Grassy Forest.

Herb-rich Foothill Forest occupies the eastern and southerly aspects on lower slopes and in gullies. It is a medium to tall open forest to 25 metres, dominated by a range of eucalypts including Narrow-leaf Peppermint, Messmate Stringybark and Mountain Grey-gum. It contains a large shrub/understorey tree layer over a sparse to dense medium shrub layer dominated by Common Cassinia, Prickly Currant-bush and Dusty Daisy-bush. It is characterised by a high diversity of herbs and grasses in the ground layer including Common Raspwort, Ivy-leaf Violet, Hairy Speedwell, Red-fruit Saw-sedge, Tasman Flax-lily, Grass Trigger-plant, Weeping Grass and Common Apple-berry. Most of the Herb-rich Foothill Forest is concentrated in areas adjacent to Kinglake National Park.

Grassy Dry Forest occupies drier sites on exposed aspects and crests of ridges or on the drier areas of sheltered slopes. It is dominated by a low to medium height open forest of eucalypts including Red Stringybark, Bundy and Red Box to 20 metres tall. The understorey consists of a sparse shrub layer, including Spreading Wattle and

Common Cassinia and is dominated by a high diversity of grasses and herbs including Honey-pots, Grey Parrot-pea, Ivy-leaf Violet, Red-anther Wallaby-grass, Wattle Mat-rush, Grey Tussock-grass and Weeping Grass.

Valley Grassy Forest occupies fertile, well drained colluvial or alluvial soils on gently undulating lower slopes and valley floors. It is dominated by an open forest of various eucalypts that prefer moist or fertile conditions including Candlebark, Yellow Box, Bundy, Red Stringybark and Narrow-leaf Peppermint to 20m tall. It contains a sparse shrub layer of Black Wattle, Burgan, Common Cassinia and Cherry Ballart. The ground layer is seasonally dominated by a diverse array of moisture loving herbs, lilies, grasses and sedges including Kidneyweed, Tall Sundew, Thatch Saw-sedge, Small Poranthera, Grey Parrot-pea, Love Creeper and Weeping Grass. At the drier end of the spectrum the ground layer may be sparse and slightly less diverse, but with the moisture-loving species still remaining.

Smaller remnants of Riparian Woodland occur along Arthurs Creek and Creekline Herb-rich Woodland along minor creeklines and tributaries. Heathy Dry Forest occurs in areas adjacent to Kinglake National Park on exposed aspects of ridge tops and steep slopes. Damp Forest occurs at higher elevations and Wet Forest exists in protected gullies in the upper reaches of Arthurs and Chadds Creek. Strathewen also contains minor remnants of Gully Woodland, Damp Heathy Woodland, Riparian Scrub, Swampy Riparian Woodland and Shrubby Foothill Forest.

Each EVC in Strathewen can be assessed in terms of its significance in our bioregion. How commonly the EVC occurred in 1750, how much is left and how degraded it is all contribute to a measure of the as the Bioregional Conservation Status (BCS). BCSs are: Least Concern, Rare, Depleted, Vulnerable, Endangered and Presumed Extinct. A map of Bioregional Conservation Status of the native vegetation EVCs' conservation status, giving us a measure known in Strathewen, is shown in **Figure 7**.

EVCs within our area range from Least Concern to Vulnerable, with the latter often found along waterways and gullies.

Care is needed when using EVC-modeled maps as they provide a guide only. Vegetation should be verified on the ground before undertaking any management actions relevant to identified EVCs.



Photo by Elena Tozer



Photo by Elena Tozer

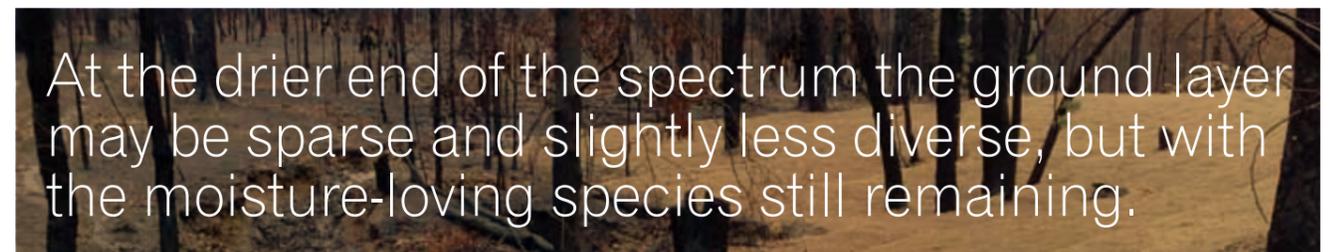


Photo by Kylie Woods

## 5.2 Biolinks

The resilience of our ecosystems can be improved by creating and maintaining biolinks. The concept of biolinks was developed as a land use tool to maintain and improve biodiversity values. It was initially targeted at fauna, and its key objective was to identify areas where connectivity could be improved to assist animals to move through the landscape. In part, biolinks can be understood as wildlife corridors which help species move across the landscape rather than remain restricted to small isolated patches. However, biolinks benefit not only flora and fauna species but also whole ecological communities. In areas dominated by agriculture or fragmented by development, biolinks may help to restore connections between habitats. They can also effectively increase the size and connectivity of existing reserves, parks and privately owned habitats.

Biolinks allow species of plants and animals to remain in areas as well as adapt and evolve, thus maximising their opportunities to respond positively to challenges such as climate change. Without these links, species and populations will become isolated and gradually disappear.

Important biolinks were identified in the NEROC Report, and Strathewen supports several strategic biolinks through Arthurs Creek, an east-west habitat link through NEROC area NUH C85 and habitat links from the east and south-east through NEROC area NUH C86. The Strathewen Landcare Group has also implemented some biolinks on private land.

Within the catchment most habitat links are intact and in good condition. However, there are some areas that have only poor or degraded links. The quality of these links may be increased by fencing them off and allowing for natural regeneration, or – if natural regeneration is inadequate – revegetation using locally indigenous species. Domestic cats and dogs must also be controlled in habitat link areas if they are to serve their purpose. Restoring and/or creating biolinks requires cooperation between land managers.



Photo by Elena Tozer

## BioSites

A BioSite is a physical area of land or water which contains biological assets with particular attributes. These attributes might be the presence of rare or threatened plants or animals or the conditions required for their survival (habitat). We have five DSE BioSites in our area. The BioSites and their significance are identified in **Table 5**, while **Figure 8** maps them. These BioSites are detailed below.

**Table 5: BioSites within the Strathewen catchment and their significance**

BIOSITE (with identification number)	SIGNIFICANCE
Apteds Bushland – Hewetts Road, Strathewen (4887)	State
Chadds Creek (4885)	State
Arthurs Creek Upper Reaches (5276)	Regional
Arthurs Creek – Middle Reaches (5073)	Regional

### 4887 – Apteds Bushland – Hewetts Road, Strathewen (State significant):

This site includes the larger private bushblocks surrounded by the Cottles Bridge-Strathewen Road, Shaws Road, Hildebrand Road and Hewetts Road. It also includes smaller adjoining blocks on the north side of Hewetts Road. Overall the BioSite covers approximately 170 hectares and meets the significance criteria for ecological integrity and viability, richness and diversity, and rarity and conservation at a State level for flora. It contains significant species including Dandenong Range Cinnamon Wattle (*Acacia leprosa*) (Dandenong Range variant), Velvet Appleberry (*Billardiera scandens* var. *brachyantha*), Wine-lipped Spider Orchid (*Caladenia oenochila*), Brush-tailed Phascogale, Lace Monitor and Barking Owl. Current identified threats include domestic stock, herbivory by exotic and native species, invasion by environmental weeds and soil disturbance and erosion.

**4885 – Chadds Creek (State significant):** This BioSite ranges along Chadds Creek from the confluence with Arthurs Creek to Kinglake National Park. It contains approximately 740 hectares of mountain and foothills. The site meets the significance criteria for ecological integrity and viability, richness and diversity, and rarity and conservation at a State level for flora and fauna. The Chadds Creek BioSite contains high richness and diversity and contains habitat and significant species including Crested Sun Orchid (*Thelymitra X irregularis*), Masked Owl, Barking Owl (*Ninox connivens*), Southern Varnish Wattle (*Acacia verniciflua*) (southern variant), Brush-tailed Phascogale, Common Dunnart (*Sminthopsis murina*), Green Scentbark (*Eucalyptus fulgens*), Lace Monitor (*Varanus varius*) and Mountain Galaxias (*Galaxias olidus*). Current identified threats include habitat fragmentation, timber harvesting, inappropriate fire regimes, invasion by environmental weeds, soil disturbance and erosion, domestic stock, herbivory and pollutions/toxins.

**5276 – Arthurs Creek – Upper Reaches (Regionally significant):** This site encompasses Arthurs Creek from above Chadds Creek confluence to Kinglake National Park and covers approximately 630 ha of mountains and foothills. The site meets the significance criteria for ecological integrity and viability, and richness and diversity for flora and fauna. It contains significant species including Climbing Galaxias (*Galaxias brevipinnis*), Lace Monitor (*Varanus varius*) and Mountain Galaxias. Current identified threats include invasion by environmental weeds, land use change and intensification of agriculture, residential and commercial development, herbivory by introduced and native species, carnivory by introduced species, pollutions/toxins, domestic stock, soil erosion and instream barriers including dams.

**5073 – Arthurs Creek Middle – Reaches (Regionally significant):** This site stretches linearly along Arthurs Creek from Arthurs Creek to Strathewen. The broadest section occurs in the extreme south at the confluence of Arthurs and Running/Deep Creeks. It includes Arthurs Creek Township and covers approximately 350 hectares of foothills. The site meets the significance criteria for ecological integrity and viability, rarity and conservation and richness and diversity for flora and fauna. It includes significant species such as Speckled Warbler, Swift Parrot (*Lathamus discolor*) and Matted Flax-lily (*Dianella amoena*). Current identified threats include invasion by environmental weeds, land use change and intensification of agriculture, residential and commercial development, herbivory by introduced and native species, carnivory by introduced species, pollutions/toxins, domestic stock, changes to water flow and levels, soil erosion and instream barriers including dams.



Photo by Celeste Geer



Photo by Elena Tozer



Photo by Celeste Geer

## 5.3 Shire of Nillumbik overlays

Two Environmental Significance Overlays from the Nillumbik Planning Scheme, ESO 1 – Sites of Fauna and Habitat Significance, and ESO 4 – Waterways, occur in the Strathewen catchment (See **Figure 9**).

The overlays have stated environmental objectives, permit requirements and decision guidelines to ensure that any planning decisions take into account the environmental values within these areas.

## 5.4 ABZECO ecological mapping

ABZECO Consultants have been engaged by Nillumbik Shire Council to revise ecological mapping. This will distinguish between two ecological categories in the Shire. Core habitat and Low-moderate habitat (see **Figure 10**).

- Areas mapped as Core are considered likely to be relied upon by rare or threatened plants and animal species.
- Areas mapped as Low-moderate habitat include vegetated areas of lower quality than the Core areas, but also include some unvegetated land that could be revegetated to provide buffer protection for Core areas and increase ecological connectivity.

This study is yet to be formally considered by Council (at November 2012).

## 5.5 Roadsides

Strathewen's roadsides generally support native vegetation, which varies in quality from low to high conservation value. Council's Roadside Management Plan is the strategic document which guides the implementation of roadside maintenance activities. This Plan focuses on balancing the sometimes competing interests on roadsides between human safety, fire risk, management of remnant native vegetation located on roadsides and ensuring a safe and efficient transport network and utility corridor.

This Plan contains updated information regarding the environmental values of roadsides in Nillumbik based on revised conservation value mapping work undertaken in winter/spring 2010. This provides guidance to Council about where resources should be allocated to protect the more valuable of these roadside reserves. The Plan has a strong emphasis on operational management of roads so that works activities do not adversely impact flora and fauna values of roadsides. **Figure 11** details the roadside vegetation quality within the Strathewen CERAP area

## 5.6 Waterway health

The Strathewen catchment falls within the Middle Yarra system. The waterways within this system are highly valued especially the Yarra main stem and tributaries and have areas of natural beauty, support many recreational activities and important animal species such as platypus. These waterways incorporate significant Indigenous and European heritage values. Community feedback has also outlined a broad spectrum of values across the Middle Yarra system, reflecting its size and diversity.

Tributaries of Arthurs Creek and Chadds Creek is a natural Reach in the Yarra Basin and within the Yarra Catchment. The latest Index of River Condition data for the Tributaries of Arthurs Creek and Chadds Creek Reach is for the five years to 30 June 2004 and was compiled by Melbourne Water. The Index of River Condition Rating for these two Creeks is good. The latest Index of River health indicates the following conditions:

Hydrology:	Good
Physical Form:	Good
Streamside Zone:	Good
Water Quality:	Excellent
Aquatic Life:	Moderate

Arthurs Creek and Chadds Creek are identified as being within the Management Units Diamond Creek (Rural) and Diamond Creek (Source) in the Port Phillip and Westernport Regional River Health Strategy (Melbourne Water 2007). Diamond Creek (Rural) is identified as being of high importance and Diamond Creek (Source) is considered very high importance. This is due to their ability to support important riparian plants, provide habitat for fish and other aquatic creatures and their water quality. The management objective for river health is to maintain ecologically healthy rivers, and Diamond Creek (Rural) is rated moderate, whereas Diamond Creek (Source) is rated good.

Future targets in the Strategy, summarised in **Table 6** below, are meant to maintain the condition of these waterways.

**Table 6:** Diamond Creek (Rural) and Diamond Creek (Source) management targets

ASPECT	Diamond Creek (Rural)	Diamond Creek (Rural)	Diamond Creek (Source)	Diamond Creek (Source)
	CURRENT RATING	TARGET	CURRENT RATING	CURRENT RATING
Water quality	Poor	Moderate	Excellent	Excellent (Maintain)
Aquatic life	Moderate	Good	Good	Good (Maintain)
Habitat and stability	Good	Good (Maintain)	Good	Excellent
Vegetation	Poor	Good	Good	Excellent
Flow	Good	Excellent	Excellent	Excellent (Maintain)



Melbourne Water has identified the following as priority for the Strathewen catchment:

- revegetating and stabilising rural reaches for macroinvertebrates which will also improve vegetation condition (Arthurs and Running Creek systems)
- improving water quality for macroinvertebrates and fish in rural areas by managing streamside vegetation (Arthurs and Running Creek systems).

In 2010, an assessment by Melbourne Water of the post-bushfire geomorphic response for Steeles, Diamond and Arthurs Creeks identified threats to river health arising from the 2009 bushfires.

*Direct effects* included the burning of vegetation and ground cover, which generates ash and increases soil water repellence. This affected faunal survival, catchment hydrology and sediment transport. The key indirect post-bushfire effects are changes in stream flow, erosion and sedimentation. These are triggered, and/or exacerbated or accelerated by rainfall events and have an impact on the following:

- aquatic fauna and flora
- flooding
- channel erosion and sedimentation
- waterways' health targets in the catchment and downstream
- stability of bridges, rock chutes, dams and other waterways infrastructure.

## 5.7 Ecological case study

# Caring for a bush block in Strathewen: Dominic Bourke and Celeste Geer

A case study with Dominic Bourke and Celeste Geer, Strathewen

Dominic Bourke and Celeste Geer own a bush block of approximately 35 hectares at 15 Rankines Road, Strathewen. The property supports a range of ecological vegetation classes including Damp Forest (EVC 29), Herb-rich Foothill Forest (EVC 23) and Heathy Dry Forest (EVC 20) and has a small tributary of Chadds Creek running through it. Approximately three hectares surrounding the house is maintained as slashed grass for fire prevention purposes with the remainder comprising native vegetation.

Native vegetation within the property is part of an important habitat link identified in the NEROC mapping (Figure 4), and mapped as high habitat and state faunal significance. It listed as Core habitat in the ABZECO mapping (Figure 10) and currently covered by an Environmental Significance Overlay (Figure 5).

Several regionally rare plants were noted on the property by botanist Dr. Graeme Lorimer during a visit ten months after the 2009 fires. These include Forest Bitter-cress (*Rorippa dictyosperma*), Austral Stork's-bill (*Pelargonium australe*), Forest Bent-grass (*Deyeuxia frigida*) and Graceful Fescue (*Festuca asperula*). Three state significant fauna, Lace Goanna (*Varanus varius*), Southern Toadlet (*Pseudophryne semimarmorata*) and the White-footed Dunnart (*Sminthopsis leucopus*), have all been recorded adjacent to the property and are likely to be present at times. Several other significant fauna species have been recorded in the local area and may also use the property.

Weeds have been the main threat to the biodiversity assets on the block, particularly Blackberry (*Rubus fruticosus* spp. *Agg.*), Thistles (*Cirsium* spp.) and Cape Weed (*Arctotheca calendula*).

Immediately following the fires, however, erosion became a problem in steeper sections of the block, particularly the banks of the creek line.

Rabbits have always been present, but since the fires they have become much more prevalent.

### Actions

Dominic and Celeste have persistently controlled weeds within their block and have been able to receive assistance through the Nillumbik Shire Council grants programs to contribute towards weed control costs. They have also been able to source funds from Melbourne Water to contribute to weed control works along the creek line. The weed level on the property has now been reduced to a level that is manageable with only a small amount of input compared to when the couple first purchased the property.

While the growth of native trees and shrubs after the fires has reduced erosion risks, Dominic and Celeste are waiting for natural thinning as plants age to reduce the density of native vegetation in heavy regrowth areas. They have slashed a track through the new regrowth to be able to access some parts of their property.

They are looking into taking part in some of the Nillumbik Shire Council rabbit control programs.

### Lessons learnt and the future

"We have been amazed at the ability of the natural environment to recover from the fire event." Celeste said. "The only real help we have given to the bush is to do a little more weed control after the fires and the bush has really recovered through natural processes. We are hoping that these conditions will still be suitable for the special fauna that we have in this part of the world."

"We are continuing to maintain the slashed vegetation clear around our house but are letting nature thin out a lot of the heavy regrowth in the bush areas by itself." Celeste said, "Since the fires there is now so much diversity of native grasses and herbs in flower during the spring time that have emerged from the burnt areas, it's fantastic to see."



"Since the fires there is now so much diversity of native grasses and herbs in flower during the spring time that have emerged from the burnt areas, it's fantastic to see."

# 6. Community Engagement and Capacity-Building

To achieve the actions identified in this CERAP, we need to see ourselves as land managers, not just landholders and residents. We need to be aware of the problems and acknowledge them as important issues. We need to be prepared to act, know what measures to take, at what scale and with whom to cooperate.

Catchment management involves:

- protecting remnant indigenous vegetation
- reconnecting fragmented native habitat
- protecting rare or endangered species
- managing invasive plants and animals
- improving pastures and soils
- protecting and enhancing waterway health.

These are all complex tasks and interconnected issues. They require cooperation between neighbours and ultimately people across the wider catchment. Major community engagement and capacity-building programs will be needed to support us in this work.

Capacity-building programs generally fall into the categories of *awareness raising, information and knowledge, skills and training, and facilitation and support*. By building peoples' *ability and motivation* to act, the capacity-building activities can contribute to greater and more effective community engagement and action in developing and implementing this CERAP.

Potential participants in capacity-building could include the following:

- subsets of landholders with specific land use interests (e.g. farmers, owners of bush blocks, and various land managers) or those located within specific neighbourhoods.
- community groups (e.g. Landcare, the CFA, Fireguard groups)
- regional organisations (e.g. Port Phillip and Westernport Catchment Management Authority, Melbourne Water, industry groups and learning institutions)
- Government agencies (local, state and federal)
- Private technical and financial advisers/facilitators.



Photo by Barrie Tully

When planning for capacity-building, a range of approaches for engaging various participants should be considered. It is important to avoid the 'one size fits all' approach, as most on-ground action is in the hands of individual landholders and local groups, and we have differing interests and needs.

In particular, the targeting process should consider those people who are not currently engaged but whose participation is critical for achieving CERAP outcomes.

Detailed consideration is needed to the following questions to maximise the success of engagement and capacity-building actions.

- What specific behaviour and practice changes are required to achieve the priority outcomes?
- What are the specific, critical capacity-building activities that will most effectively support the achievement of these changes?
- What pre-requisite and co-requisite activities are required to successfully undertake these capacity-building activities?
- What has already been done and is the proposed activity building on this?
- Where geographically within the catchment should capacity-building activities be targeted in order to best achieve priority outcomes?
- Who within the target areas should be specifically identified for involvement in capacity-building?
- When should specific capacity-building activities be undertaken and in what order? Which are time critical, and which cannot be undertaken until others have been completed?
- Which are the most appropriate delivery mechanisms in terms of who delivers the services (e.g. local government, catchment management authority, community support network, educational institution or other organisation/group)? What should be their approach?
- Who will supply the resources?



# 7. Challenges for Management of the Strathewen Catchment

## Agriculture

Our residents are attracted to both the agricultural and bushland landscapes of the Strathewen catchment. The settlement pattern that combines agriculture and bushland has both production value and value for maintaining the ambience of the landscape. Small farms and bush properties are the most numerous forms of establishments, with few traditional broad acre properties. The many small to medium-sized farms are mainly beef cattle or horse-raising enterprises.

Operators of small farms generally rely on off-farm income, and purchase of a small farm is likely to be a lifestyle decision. The combining of farming with non-farm income as a permanent change is therefore crucial to the future sustainability of Strathewen. The proximity of Strathewen to the Melbourne metropolitan area enables small producers to focus on value-adding and produce sales to tourists and customers of farmers markets.

Challenges for farmers in our catchment include drought, water scarcity, increased running costs and reduced viability of traditional commercial agricultural enterprises. Climate change, growing urbanisation and new patterns of land use, threats from the introduction and spread of weeds and pests, and changing community and consumer expectations are further challenges.

## Pasture quality

The quality of pasture is, of course, an important issue for farmers.

Pasture deterioration leads directly to inter-related components and drivers of soil degradation including topsoil depletion, compaction, increased water run-off, erosion, loss of soil fertility, acidification and a crash in soil biota. This in turn causes degradation of local waterways and water-bodies as a result of an increase in sediment and nutrient load.

Pasture deterioration also exposes areas to weed invasion, creating new weed hot-spots which then become threats to nearby agriculture and biodiversity. Sustainable pasture management is a topic of farm planning in itself. Pasture mismanagement, such as over-grazing, is a consequence of poor knowledge. It is a drain on the ecological, productive and economic resources of a property and hence would never be knowingly practiced.

## Ecological values and native vegetation

There is strong appreciation for the bush in the Strathewen community and awareness of the catchment's ecological values. The bush landscapes of Strathewen have always attracted many residents and visitors to the area and justly continue to do so. Much of the remnant bushland in Strathewen is privately-owned, linking in with Kinglake National Park.

The protection and enhancement of our existing remnant bush with its animal and plant populations is the best way to conserve biodiversity across these landscapes. Native animals struggle to replenish their population numbers when they have to move between small areas of habitat in a fragmented landscape with little connectivity. Fragmentation is worsened after disturbance events such as bushfire. Therefore, large natural areas of remnant vegetation are of fundamental importance for nature conservation and are irreplaceable. All other things being equal, large remnants are inherently more valuable than groups of small, fragmented patches that add up to the same size.

If areas of bushland have become degraded, natural regeneration of native plant species is best, as we have seen post-fire that the bush is uniquely adapted to fire. Research shows that restoration of bushland through revegetation or reintroduction is unlikely to return an area to its original condition with all of its inherent ecological processes and resilience. These ecological processes are vital in the services they provide to the human community – carbon sinks, for example. Restoration should be targeted firstly to areas of high quality, moving on to those of lower quality when time permits. Threats to biodiversity such as weed incursion should be treated at their source.

While the Strathewen area supports large areas of relatively intact native vegetation, there are also scattered mature native trees in agricultural paddocks. These provide various benefits for productivity such as shelter for stock, reduction of wind and water erosion, and seeds for regeneration (in the paddocks and elsewhere). They can be important habitat for native fauna, providing conduits or stopping-off points for animal movement between patches of intact vegetation, and they may also be a source of food. These trees are threatened by ringbarking and uncontrolled grazing in agricultural areas with biodiversity values. As a result, they are prone to dieback.



Photo by Elena Tozer

## Waterways

Our waterways and their unique riparian plants need protection too. Melbourne Water rates the Arthurs Creek and its tributaries as of very high regional importance. The current condition is rated as good, and the management objective is to improve the condition of the creek. It is described as having:

“.... excellent channel form, good streamside vegetation and its headwater reaches have been defined as ecologically healthy. Weeds pose a risk to both headwater and rural sections.”

When creeks and significant gullies are left unfenced, stock may have access to graze and trample riparian vegetation. Creek banks become trampled and begin to erode, and water quality is reduced. This practice often goes hand in hand with overgrazing of pastures, particularly in times of low rainfall or overstocking.

## Erosion

The Strathewen catchment generally has highly edispersive, easily dissolved subsoils. The likelihood of erosion is greater in areas that have:

- steep slopes
- disturbed topsoil
- concentrated flows of water
- vertical drops in the bed of drainage lines.
- poor coverage of vegetation
- high rabbit populations.

Note: A combination of these factors increases the risk.

Much of the steep land of the Strathewen catchment was bared of vegetation by the 2009 fires. This resulted in higher volumes of faster flowing rainfall run-off. This caused a significant spike in erosion. Fortunately, the natural recovery of vegetation across the catchment has been dramatic and this has helped to stabilise rainfall run-off and erosion rates. Engineered solutions to stabilising active erosion sites have been required in situations where the activity of the erosion has been a serious threat to infrastructure or the natural/productive environment,

The sediment load that is generated via an accelerated rate of erosion has serious consequences for downstream waterways and waterbodies. This includes siltation of in-stream pools and other waterbodies which alters the aquatic ecological conditions and degrades the in-stream biota.



## Pest plants

Pest plants – weeds – are rightly considered by many Strathewen landholders to be a high priority for land management. The Strathewen catchment contains, and always has done, a wide range of weeds. They include long established agricultural weeds, environmental weeds of bushland. Weeds of greatest concern are aggressively invasive environmental weeds and new incursions of environmental weeds.

Weeds reduce the natural values of bushland and some particularly invasive types of weeds are capable of eliminating individual local plant species or entire vegetation communities. On agricultural land, weeds reduce grazing productivity, lower cropping capability and contaminate produce. Other weeds can injure or poison stock and pets. Weeds in both bushland and agricultural land provide a harbour for pest animals and disease.

Strathewen landholders have witnessed extensive opportunistic invasions of weeds, some familiar and some new, since the 2009 fires. Weeds have colonised land that was used for pasture before the fires and may out-compete fire-affected pasture species. Weeds have also appeared in what were previously intact areas of bushland where the natural ground cover was destroyed. These weeds have been spread by airborne seed, carried by birds and animals, or encroached from roadsides. Poor machine hygiene following the movement of trucks, earth moving and other machinery during the clean up and rebuilding process also brought weeds on to properties in the area. Garden escapee plants, whether 'natives' or exotics, have also benefited in some cases from the post-fire environment and widened their range. Landholders have been overwhelmed with many

decisions post-fire, properties have changed hands and frequently sound land management practices have fallen off the agenda.

We are now faced with challenges in controlling weeds in this post-fire environment. While some species have not proved to be as problematic as first feared, significant work is required to contain them and control further spread. Factors in this control are complex and include landholders developing an understanding of weed biology, improving our knowledge about the impact of weeds on our native ecosystems and improving our ability to identify weed species. Knowledge of these factors all contribute to empowering the landholder to confidently identify and treat weeds. A further challenge in Strathewen and other fire affected areas are properties with absentee landholders and new and emerging pest plants.

The Shire of Nillumbik lists 126 species as local environmental weeds. In addition to the Shire list, other weeds are declared pest plants under the provisions of the *Catchment and Land Protection Act 1994*. While these primarily threaten agriculture, many have severe impacts on native plant communities. New and emerging weeds are becoming of great concern, particularly Chilean Needle Grass, Serrated Tussock and Bridal Creeper (*Smilax*).

Many of the pest plants in the catchment are garden escapees such as Sweet Pittosporum (*Pittosporum undulatum*) and Agapanthus (*Agapanthus praecox*). Other environmental weeds include Blackberry (*Rubus fruticosus*), Thistles (*Cirsium* spp.) and Panic Veldt grass (*Ehrharta erecta*).

## Pest animals, including domestic cats and dogs

The most significant pest animals in the Strathewen catchment are rabbits and foxes. They are widespread in agricultural and bushland areas, and their effective control requires continual cooperative management between neighbours. Deer and wild dogs have also been reported in the area. Feral cats and dogs are predators too – a problem linked to increased urbanisation.

Pest animals typically have few natural predators or fatal diseases, and some have high reproductive rates. As a result, their populations have not naturally diminished and they can multiply rapidly under favourable conditions.

### Rabbits

Rabbits threaten the values of public and private lands.

Nillumbik Shire Council provides incentives for rabbit control and is currently seeking to use these to encourage the establishment of rabbit action groups. Specifically, a subsidy is offered if you are working with your neighbours in such a group. These funds generally cover approximately a third of works costs.

The DPI may also use the provisions of the CaLP Act 1994 to enforce rabbit control on private land.

The most appropriate method for rabbit control will depend upon your situation, available resources and preferences. Refer to Best Practice guides for more details.

All methods used must comply with relevant agricultural chemical, animal welfare and firearms legislation. Baiting for rabbits with 1080 poison is not usually undertaken because of the unacceptable risk to domestic pets in the closely settled locality.

### Foxes

Foxes are identified in the NEROC Report as a threat to regional biodiversity and penetrate deep into residential areas. They cause serious environmental damage through predation and the spread of disease on native animals. They may also attack newborn livestock, raid chicken coops and disturb domestic pets.

As for rabbits, the most appropriate method for fox control will depend upon your situation, available resources and preferences, and methods must comply with relevant regulations. Refer to Best Practice guides for more details.

### Wild Deer

Wild deer are one of Australia's worst emerging pest problems, causing damage both to the natural environment and agriculture. Populations in Strathewen may be expanding, with deer invading new areas since the 2009 fires. Control should occur now while the population is emerging. Appropriate control methods should be developed in consultation with DSE and Nillumbik Shire Council.

### Wild Dogs

Wild dogs are declared 'established pest animals' under the CaLP Act 1994. They are a major threat to livestock and production on private land in provincial Victoria, and they prey on native fauna. Control programs should be developed in consultation with DSE, DPI and Nillumbik Shire Council.

The DPI offers support to producers after wild dog attacks.

The most significant pest animals in the Strathewen catchment are rabbits and foxes. They are widespread in agricultural and bushland areas, and their effective control requires continual cooperative management between neighbours. Deer and wild dogs have also been reported in the area.

### Domestic animals

Direct predation by cats and dogs can be devastating to many indigenous animals, most particularly to ground-dwelling and foraging species such as quail, bush rats, frogs and even possums. Cats will readily climb and take birds, gliders and bats. Dogs that are regularly allowed to roam free from their property can form packs and will attack larger native mammals.

Containing pets within restricted areas on your property will not only protect biodiversity but will also safeguard your pets.

## Burgan

Burgan (*Kunzea ericoides*) can be of concern. It is a native shrub species and occurs naturally in the Strathewen catchment, but it commonly colonises disturbed areas and can alter the structure of native vegetation by out-competing other shrub and understorey species, to reduce biodiversity. Burgan can also colonise areas near infrastructure such as dwellings and sheds and become a fire hazard. Planned removal of Burgan from these areas may be an appropriate strategy. It is important to note that Burgan removal may require a permit, so check with Council prior to commencing works.

## Fire

Fire is part of the history of the Strathewen catchment, and three major fires have occurred in the last 72 years. In 1939 the whole area was burnt. The January 1962 fire burned through Kinglake National Park to Strathewen and south to St Andrews.

In the 2009, fires Strathewen suffered the tragic loss of 27 people. The community's buildings and facilities were destroyed, agricultural businesses were severely impacted, 82 private properties were damaged or destroyed and trade businesses were adversely affected. Native flora and fauna were seriously affected, and substantial damage occurred to local waterways. Significant damage also occurred to road infrastructure and signs, with erosion damage to drainage infrastructure and culverts. Subsequent rain led to further erosion and flood damage in burnt areas and unburnt areas downstream.

Many plants and animals have evolved to survive fire events, and are reliant on fire to regenerate and maintain their health. In particular, biodiversity is dependent on

appropriate fire regimes (fire intensity, frequency, season, extent and type). Most native vegetation burnt in the 2009 fires is regenerating by natural processes. However, in some cases, for example where erosion is occurring, planting of native vegetation or direct seeding may be required to stabilise soils and assist with the natural process of regeneration.

Projections for future temperature and rainfall indicate increased drought and bushfire events. Slope, aspect and vegetation type are landscape characteristics that influence the degree of fire hazard. Farmers and residents on bush blocks need to ensure that their management practices are adapted to, and minimise, the increased fire risks to property and life. Useful information on vegetation fire hazard is provided in the DSE publication of July 2010:

[Overall Fuel Hazard Assessment Guide](#)

## Climate change

The report published by Land and Water Australia in 2008, projects that Victoria's future climate will differ from that of the past.

Temperature projections are for continued warming. Rainfall projections are more mixed than for temperature but mainly indicate a drying trend, particularly during winter and spring. The combination of projected warming and less rainfall has significant implications for communities, agriculture and stream flow.

By 2030, annual rainfall in Victoria is projected to decrease by up to 5 per cent relative to around 1990. By 2070, a decrease of 5 to 10 per cent is most likely under a low greenhouse gas emission scenario, or a 10 to 20 per cent decrease under a high emission scenario. Winter and spring rainfall is likely to decrease, while changes in summer and autumn rainfall are less certain. Projections

show an increase in rainfall intensity and an increase in the number of dry days, which means we are likely to experience longer dry spells interrupted by heavier rainfall events.

By 2030, Victoria's annual average temperatures may increase by at least 0.6° C relative to around 1990. By 2070, this may increase by 1.0° C under a low emission scenario, and at least 2.5° C under a high emission scenario. These increases could be accompanied by an increase in the frequency of very hot days and nights, so that by 2030 there are likely to be more days per year above 35° C. By 2070 and under a high emission scenario, the number of days over 35° C may have doubled. Conversely, the frequency of frosts and very cold days and nights is likely to decline.

The combination of projected warming and less rainfall has serious implications for run-off and water storage. By 2030, stream flow into Victorian dams is projected to decline by 7 to 35 per cent relative to historical average flows.

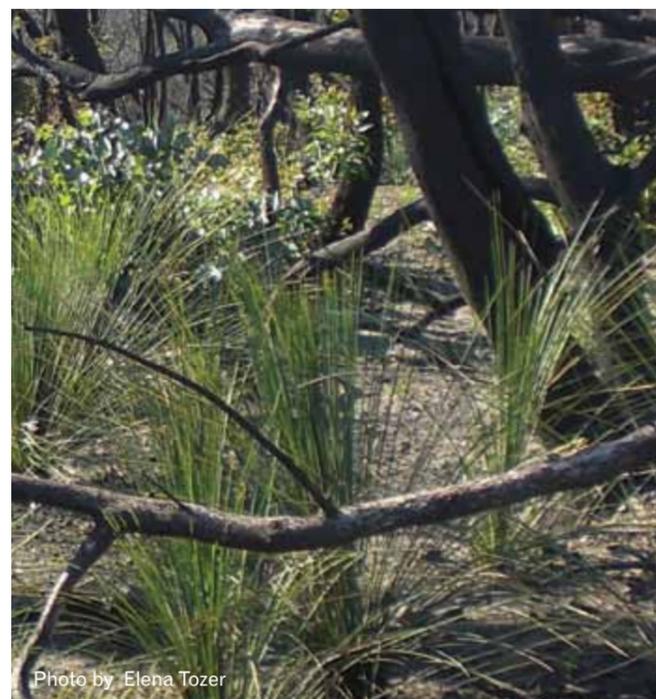
In summary, the projected changes would induce a range of threats to agriculture, including:

- declining productivity due to increased drought and bushfires
- crop and pasture yields benefitting from warmer conditions and higher carbon dioxide levels, but vulnerable to reduced rainfall
- reduced availability of water
- greater exposure of stock and crops to heat-related stress and disease
- earlier ripening and reduced grape quality
- less winter chilling for fruit and nuts
- southern migration of some pests
- a potential increase in the distribution and abundance of some exotic weeds.

These climate change-induced threats to agriculture could create a greater demand for agricultural land and agricultural production in cooler, higher rainfall regions in the state. This could include the Strathewen catchment.

Climate change is also predicted to have a marked impact on biodiversity through many factors such as changes in vegetation structure including a decrease in foliage quality, and reduction in range for the majority of vertebrate species. Increased temperatures are expected to result in changes to vegetation composition. It is likely that changes in structure, productivity and foliage quality will have flow-on effects to other aspects of biodiversity. Climatologists suggest that climate change will result in a drying climate and more intense and frequent fires, with the following impact on biodiversity:

- smaller areas of refugia as a result of larger scale fires, slowing the re-colonisation of burnt areas and the recovery of populations, possibly resulting in local extinctions
- increased fire mortality of drought-stressed plants, notably eucalypts
- reduced post-fire recruitment of flora
- loss of core areas of biodiversity.



## Protection of significant animal and plant species

Recovery Plans and Flora and Fauna Action Statements have been created for several significant fauna species within the Strathewen catchment. Not all significant species have plans to date. These plans contain information on the description and distribution of the species, management issues, threats and intended management actions. Specific plans provide detailed information on individual species. Please note that while significant flora species have not been previously recorded within the Strathewen catchment there is potential habitat for significant flora species. Relevant plans for fauna species recorded in Strathewen are identified in **Table 7**.

### Note:

- Flora and Fauna Action Statements can be accessed electronically on the DSE FFG Action Statements home page.
- National Recovery Plans can be accessed electronically through the Australian Government's Recovery Plans webpage.

**Table 7:** Significant fauna species with National Recovery or Flora and Fauna Guarantee Action Plans

SPECIES (with status)	RECOVERY PLAN / ACTION PLAN DOCUMENTS
Growling Grass Frog ( <i>Litoria reniformis</i> ) (Nationally Significant)	National Recovery Plan for the Southern Bell Frog ( <i>Litoria reniformis</i> )
Powerful Owl ( <i>Ninox strenua</i> ) (State Significant)	FFG Action Statement No. 92
Brush-tailed Phascogale ( <i>Phascogale tapoatafa</i> ) (State Significant)	FFG Action Statement No. 79
Barking Owl ( <i>Ninox connivens</i> ) (State Significant)	FFG Action Statement No. 116
Masked Owl ( <i>Tyto novaehollandiae novaehollandiae</i> )	FFG Action Statement No. 124
Intermediate Egret ( <i>Ardea intermedia</i> )	FFG Action Statement No. 120
Eastern Great Egret ( <i>Ardea modesta</i> )	FFG Action Statement No. 120
Painted Honeyeater ( <i>Grantiella picta</i> ) (State Significant).	FFG Action Statement No. 193

By 2030, annual rainfall in Victoria is projected to decrease by up to 5 per cent relative to the climate of around 1990.

# 8. Actions

Sustainable catchment management is complex, especially in Strathewen with its mix of private and public land in key environmentally sensitive areas.

Actions have to be planned at the catchment level and require collaboration between land managers and coordination of works across private and public land property boundaries. For instance, an action initiated by an individual property owner may fall under the responsibility of, say, Parks Victoria, Melbourne Water or Nillumbik Shire. In such cases, collaborative work between landholders, Landcare and other agencies can achieve greater, longer term sustainable outcomes.

Such a context, however, may be challenging for some landholders (both public and private) and this is where community education in caring for our catchment and capacity-building to work together effectively become crucial (see Section 6).

The following table outlines potential land management actions, together with the relevant responsible agencies. They are grouped into themes of agriculture, waterway health, biodiversity and rural living.

## 8.1 Agriculture

### Goals

- To encourage adoption of 'best' practices in all agricultural landscapes.
- To identify sustainable agricultural enterprises for the future.

ACTIONS	RESPONSIBILITY
<p><b>Minimise weeds now and in the long-term.</b></p> <ul style="list-style-type: none"> <li>• Prevent and intervene early to eradicate new weeds.</li> <li>• Contain and reduce the level and impact of existing weeds.</li> <li>• Maintain achievements in weed management.</li> <li>• Collaborate with neighbours, Nillumbik Shire Council, Parks Victoria and Melbourne Water to prioritise and control weeds.</li> <li>• Educate yourself about key weeds in your area.</li> </ul>	<p><b>Landholders and Landcare</b></p>
<p><b>Improve weed knowledge and control in the community.</b></p> <ul style="list-style-type: none"> <li>• Identify and map weed distribution and prioritise weeds for control.</li> <li>• Engage with Landcare groups.</li> <li>• Facilitate better communication between Council Roadside works crews and Council's Environmental section.</li> <li>• Coordinate landholders' weed control measures.</li> <li>• Provide more public information (e.g. letters and pamphlets) for land managers including new managers and help them plan and adopt weed control measures.</li> <li>• Promote the benefits of weed management for landholders' own and adjacent properties.</li> <li>• Send a rate notice reminder for weed eradication and control (e.g. for Blackberry).</li> <li>• Improve land managers' access to professional advice, courses and forums about weeds from various agencies.</li> <li>• Improve contractor knowledge and practices to prevent the spread of weed species (e.g. Chilean Needle grass).</li> <li>• Provide funding for specialist weed spotters and spraying.</li> <li>• Promote Council's Land Management Incentives program.</li> <li>• Ensure that contractors apply vehicle hygiene and earthworks practices to reduce the spread of weeds.</li> <li>• Provide an expert person to confirm species identification (Photographs are useful but are not sufficient to provide confidence in species identification).</li> <li>• Hold weed management field days in the catchment.</li> <li>• Identify garden plants that have the potential to become bushland invaders.</li> </ul>	<p><b>Landcare</b></p>
<p><b>Provide whole property/farm planning and advice sessions and/or courses.</b></p> <ul style="list-style-type: none"> <li>• Include sections on land capability, biodiversity weed and pest animal control, erosion control, farm water management, soil and pasture management and bushfire planning.</li> <li>• Target new land managers.</li> </ul>	<p><b>Landcare, Council and DPI</b></p>
<p><b>Protect existing scattered paddock trees and limit dieback.</b></p> <ul style="list-style-type: none"> <li>• Fence selected trees to protect them from stock and routine agricultural practices in the paddock.</li> <li>• Plant shade trees away from isolated paddock trees for stock.</li> <li>• Do not apply fertiliser in the root zone of the tree.</li> <li>• Reduce herbicide spray drift as much as possible.</li> <li>• Do not burn logs, stumps or fallen branches. If they are in an inconvenient place, move logs to a more appropriate remnant vegetation area or creek to provide wildlife habitat.</li> </ul>	<p><b>Landholders</b></p>

## 8.1. Agriculture (continued)

ACTIONS	RESPONSIBILITY
<p><b>Help natural regeneration.</b></p> <ul style="list-style-type: none"> <li>• Use temporary fencing and enclose an area twice the size of the tree canopy to encourage regeneration.</li> <li>• Manage grazing to help young plants survive.</li> <li>• Control herbivores such as rabbits and goats.</li> </ul>	<p><b>Landholders</b></p>
<p><b>Control pest animals.</b></p> <ul style="list-style-type: none"> <li>• Plan and adopt pest animal control measures and have access to suitable machinery and equipment.</li> <li>• Cooperate with your neighbours in planning and taking action.</li> <li>• Use Council's Land Management Incentives program.</li> <li>• Seek advice from professionals and use skilled contractors if necessary.</li> <li>• Education on pest animal species and their effects.</li> </ul>	<p><b>Landholders</b></p>
<p><b>Implement pest animal control programs.</b></p> <ul style="list-style-type: none"> <li>• Continue existing and form new rabbit action groups.</li> <li>• Continue successful fox and rabbit control programs.</li> <li>• Target control programs at deer and goats.</li> <li>• Provide landholders with advice, including workshops on rabbit control.</li> <li>• Provide access to machinery and equipment for rabbit and fox control as well as skilled contractors.</li> <li>• Educate land managers on the impacts and responsibilities of pet ownership.</li> </ul>	<p><b>Landcare and Council</b></p>
<p><b>Prevent and control erosion.</b></p> <ul style="list-style-type: none"> <li>• Maintain a healthy vegetative cover across the land.</li> <li>• Work towards increasing the health and depth of topsoil via sound land management practices.</li> <li>• Maintain debris (logs, stick and leaves) in bushland areas.</li> <li>• Undertake active integrated rabbit control programs with neighbours.</li> <li>• Avoid actions that change the natural flow of water over the land surface or within waterways. In particular avoid changing broad surface flow into concentrated 'channelized flow'.</li> <li>• Avoid soil disturbance such as removal of topsoil or any earthworks that might provide water with easy access to the sub-soil.</li> </ul>	<p><b>Landholders</b></p>
<p><b>Assist landholders to control erosion.</b></p> <ul style="list-style-type: none"> <li>• Identify the extent and severity of erosion in Strathewen, and map erosion problems, including silting of dams.</li> <li>• Provide technical support for design, siting and construction of drainage, roadways and farm dams.</li> <li>• Provide technical information and on-site advice regarding erosion control measures</li> <li>• Ensure there is accessible advice regarding sustainable land use to prevent erosion (e.g. within Property Planning Courses).</li> </ul>	<p><b>Council</b></p>

## 8.1. Agriculture (continued)

ACTIONS	RESPONSIBILITY
<p><b>Maintain adequate pastures.</b></p> <ul style="list-style-type: none"> <li>• Ensure that grazing pressure does not exceed carrying capacity for your particular land capability.</li> <li>• Use grazing systems suited to the production potential or persistence of the pasture type on your land (e.g. rotational grazing).</li> <li>• Undertake soil testing and use adequate input of fertilisers and minerals.</li> <li>• Improve your knowledge of pasture management and your particular soil type.</li> <li>• Prepare a Property Management Plan to maximize you knowledge and create a workplan to achieve sustainable, efficient and productive land management.</li> </ul>	<p><b>Landholders and DPI</b></p>
<p><b>Promote suitable pastures.</b></p> <ul style="list-style-type: none"> <li>• Promote awareness of suitable pasture species, establishment and management techniques.</li> <li>• Provide programs and funding for an agronomic extension officer.</li> <li>• Provide access to professional knowledge.</li> <li>• Provide access to technical information.</li> <li>• Provide job-lotting for soil tests for a large number of landholders.</li> </ul>	<p><b>Council, DPI and Landcare</b></p>
<p><b>Plan for bushfire events.</b></p> <ul style="list-style-type: none"> <li>• Understand and become involved in developing the Fire Safety Plan for Strathewen.</li> </ul>	<p><b>Landholders</b></p>
<p><b>Assist landholders to prepare for bushfire.</b></p> <ul style="list-style-type: none"> <li>• Coordinate development of the Fire Safety Plan for Strathewen on environmental and land management matters.</li> <li>• Investigate the findings of other studies into regeneration after fire to understand the nature of natural succession and fuel-load build-up.</li> <li>• Draw on local knowledge of fire history.</li> <li>• Improve knowledge, particularly for new landholders, through improved access to CFA fire plans and strategies.</li> <li>• Improve land managers' knowledge through improved information access, particularly on ways to respond to seasonal variability and extremes of weather.</li> </ul>	<p><b>Council and Landholders</b></p>
<p><b>Develop a plan to manage Burgan for fire prevention purposes.</b></p> <ul style="list-style-type: none"> <li>• It is important to note that Burgan removal may require a permit or may be protected under a property specific covenant or Section 173 Agreement. So check with Council prior to commencing works.</li> <li>• Make sure other native flora species are not destroyed during the removal program, by using appropriate removal techniques.</li> </ul>	<p><b>Landholders</b></p>

## 8.1 Agriculture (continued)

ACTIONS	RESPONSIBILITY
<p><b>Building capacity of new landholders.</b></p> <ul style="list-style-type: none"> <li>• Develop a series of Land management fact sheets and a property management planning template/workbook.</li> <li>• Provide regular land management field days, information sessions and courses.</li> <li>• Target advice to new landholders (e.g. develop location specific Landcare information 'welcome' packages).</li> </ul>	<p><b>Landcare and Council</b></p>
<p><b>Improve community understanding about climate change.</b></p> <ul style="list-style-type: none"> <li>• Provide information to land managers, particularly on ways to respond to seasonal variability and extremes of weather.</li> </ul>	<p><b>Council, DPI, Port Phillip and Western Port Catchment Management Authority</b></p>
<p><b>Identify and promote sustainable agricultural enterprises for the future.</b></p> <ul style="list-style-type: none"> <li>• Prepare a case for the protection of strategically important agricultural land from further development.</li> <li>• Trial potential alternative crops.</li> <li>• Encourage and educate small-scale agricultural producers to maintain agricultural land in sound condition by applying sustainable practices and remedying past land problems such as soil erosion.</li> <li>• Provide short courses for small producers to focus on viable enterprises, value-adding and produce sales to tourists and customers of farmers markets.</li> <li>• Promote the Victorian Government's Farmers Markets Support Program – funding for rural, regional and peri-urban councils to undertake feasibility studies into proposed farmers markets, establish new markets and expand on existing ones.</li> <li>• Promote appropriate land use based on land capability and agricultural land quality (see Section 4 of this CERAP).</li> </ul>	<p><b>Council, DPI and Landholders</b></p>



Photo by Celeste Geer

## 8.2 Waterway health

### Goal

- To manage the catchment for protection and improvement of water quality.

ACTIONS	RESPONSIBILITY
<p><b>Protect waterways in your area.</b></p> <ul style="list-style-type: none"> <li>• Exclude stock from waterways by fencing and providing alternative reticulated water supply.</li> <li>• Regenerate and enhance riparian vegetation.</li> <li>• Cooperate with your neighbours along streams.</li> <li>• Investigate potential for assistance under Melbourne Water's Stream Frontage Management Program</li> </ul>	<p><b>Landholders</b></p>
<p><b>Improve community knowledge of how to keep waterways healthy.</b></p> <ul style="list-style-type: none"> <li>• Undertake vegetation mapping.</li> <li>• Undertake stream condition assessments.</li> <li>• Coordinate actions of adjoining landholders along streams.</li> <li>• Improve knowledge of new and existing landholders through improved access to information.</li> <li>• Provide incentives to fence waterways and establish off-stream water supply.</li> <li>• Increase controls on the design of private roads, dams and drains.</li> <li>• Promote Melbourne Water's Stream Frontage Management Program to private landholders with freehold or licensed waterway frontage. (The program provides support for fencing, off-stream stock watering, weed control and revegetation).</li> <li>• Target other municipalities, Parks Victoria and Committees of Management to complement works on private property, through Melbourne Water's Corridors of Green Program.</li> <li>• Support community groups to access Melbourne Water's Community Grants Program when working on public land.</li> <li>• Ensure project coordination between agencies and community organisations in relation to waterway management.</li> </ul>	<p><b>Council, Melbourne Water and Landcare</b></p>



Photo by Celeste Geer

## 8.3 Biodiversity

### Goals

- To protect and enhance native vegetation and fauna populations.
- To secure important biolinks by protecting and enhancing remnant native vegetation and linking core areas.

ACTIONS	RESPONSIBILITY
<p><b>Protect flora and fauna in your area.</b></p> <ul style="list-style-type: none"> <li>• Control domestic cats and dogs so that they do not pose a threat to native fauna, and keep them out of habitat links.</li> <li>• Control pest animals such as feral cats, foxes, rabbits and deer.</li> <li>• Control pest plants (weeds) in known habitat areas, to maintain and enhance existing fauna habitat and protect significant flora and fauna.</li> <li>• Retain timber in native vegetation areas to provide habitat for hollow-dependent animal species.</li> <li>• Protect and establish seedlings from scattered native paddock trees.</li> <li>• Fence around remnant vegetation where possible with wildlife friendly fencing.</li> <li>• Fence off areas that can act as corridors to link core areas of native vegetation.</li> <li>• Implement re-vegetation in areas where natural regeneration is not adequate.</li> <li>• Conduct fuel reduction activities to ensure that large hollow-bearing trees are not destroyed during intense fire situations. This includes raking for a minimum of one metre around all big old trees. (Hollows suitable for many fauna species do not form in eucalypts until they are 150–200 years old).</li> <li>• Be aware that some predatory native fauna may also be affected by poisoning regimes aimed at rabbits, which may be a food source for some animals, particularly owls and the nationally significant Spot-tailed Quoll. (More information on alternative methods of rabbit control can be found on the Victorian DPI Integrated rabbit control webpage).</li> <li>• Establish a monitoring program to record fauna findings.</li> <li>• Enter into a voluntary agreement through Trust for Nature or Land for Wildlife.</li> </ul>	<p><b>Landholders</b></p>
<p><b>Improve community knowledge of biodiversity in Strathewen.</b></p> <ul style="list-style-type: none"> <li>• Promote community awareness of significant species.</li> <li>• Promote the Nillumbik Shire Council Land Management Incentive Program to landholders adequately managing their land.</li> <li>• Educate landholders on the benefits of protecting and retaining native vegetation.</li> <li>• Ensure all new landholders are aware of the ecological values on their property and understand their responsibilities to maintain native vegetation and the benefits of linking core areas.</li> <li>• Increase community knowledge about the effects of fire on native flora and fauna.</li> </ul>	<p><b>Council and Landcare</b></p>
<p><b>Monitor and record fauna species in the catchment.</b></p> <ul style="list-style-type: none"> <li>• Provide training for volunteers.</li> <li>• Set up a centralised portal to store and access data. This could include an online volunteer database for community members to record data, set up by the Landcare group with support from Council.</li> </ul>	<p><b>Council and Landcare</b></p>

## 8.3 Biodiversity (continued)

ACTIONS	RESPONSIBILITY
<p><b>Reduce stock access to native vegetation.</b> Implement measures to protect flora and fauna.</p> <ul style="list-style-type: none"> <li>• Implement permit conditions in important fauna habitat links that prohibit dogs and cats in new developments.</li> <li>• Using DSE 2005 EVC mapping and recommendations from the ABZECO mapping prioritise areas for protection and restoration.</li> <li>• Liaise with the Landcare group and DSE to determine areas of highest ecological value.</li> <li>• Engage Nillumbik Shire Council staff and external consultants to provide technical support and Engage with.</li> <li>• Encourage private landholders with potential habitat to enter into voluntary agreements that protect habitat, such as Trust for Nature or Land for Wildlife.</li> <li>• Investigate how much land is still being actively used for agricultural purposes in Strathewen. Ensure that land not being used for agriculture is still being managed appropriately.</li> </ul>	<p><b>Council</b></p>
<p><b>Investigate the possibility of implementing a controlled burning regime – on private and public land where appropriate.</b></p>	<p><b>CFA, Council and Landholders</b></p>

## 8.4 Rural living

### Goals

- To encourage adoption of sustainable land management practices.
- To encourage protection and enhancement of biodiversity values.

ACTIONS	RESPONSIBILITY
<p><b>Carry out strategic planning for the future of 'rural living' in the Shire.</b></p>	<p><b>Council</b></p>
<p><b>Conduct research and development where critical information is lacking.</b> <b>The following themes are important:</b></p> <ul style="list-style-type: none"> <li>• socio-economic research</li> <li>• decision-tool development including 'best practice' guides</li> <li>• alternative production or management practices.</li> </ul>	<p><b>Council</b></p>
<p><b>When planning for capacity building, avoid the 'one size fits all' approach.</b></p> <ul style="list-style-type: none"> <li>• Consider individual landholders and local groups with differing interests and needs, such as subsets of landholders with specific land use interests (e.g. farmers, owners of bush blocks, and Melbourne Water) or those located within specific neighbourhoods.</li> <li>• Engage people who are not necessarily currently engaged but whose participation would be useful for achieving CERAP outcomes, such as students, community groups, industry groups, government officers including local government community support officers and coordinators, and educational institutions.</li> <li>• Establish networks and forums (e.g. NERWG) to ensure program / project coordination between all relevant agencies and community organisations in relation to enhancing biodiversity and sustainable agriculture.</li> </ul>	<p><b>Landcare, Melbourne Water and Council</b></p>

# 9. Potential Demonstration and Priority Projects

While all goals and problems need to be tackled over time, there will always be inadequate financial and personnel resources. Accordingly, priorities need to be identified. It is also good practice to have a range of projects developed and ready to activate as opportunities arise. Public funding associated with natural resource management is now typically project-based. A well-known recent example of this at the Australian Government level is the 'Caring for Our Country' funding.

Priority projects over the next five years emerged from the community workshops and are provided below.

The scale of the projects may be geographically contained within the Strathewen catchment, developed across two or more of the Strathewen, St Andrews and Christmas Hills CERAP areas, or Shire-wide.

The final selection of projects and their scale requires decision by the Strathewen community in consultation with Council, Nillumbik Natural Environment Recovery Working Group (NERWG) and, as needed, the other CERAP communities.

## 9.1 Protecting agriculture and biodiversity assets from weeds and pest animals

<b>PROJECT TITLE:</b> Protecting and enhancing agriculture and biodiversity assets in the Strathewen catchment through control of weeds and pest animals	
<b>GOALS</b>	To encourage adoption of sustainable agricultural practices. To protect and enhance native vegetation and fauna populations.
<b>PROJECT OBJECTIVE</b>	Control of pest plants and animals to protect agricultural and conservation assets.
<b>BACKGROUND</b>	Pest plants and animals have a considerable impact on agricultural production and ecological health in the Strathewen catchment. This is due to a range of natural and human-induced features including the catchment's proximity to Melbourne and its position at the interface between rural and urban areas. The catchment has experienced substantial restructuring in property sizes and ownerships, and it contains a variety of land with agricultural and bushland uses. This in turn results in continuous changes in community structures and dynamics and presents challenges in achieving and maintaining sustainable agricultural and ecological land use.
<b>PROBLEM DESCRIPTION</b>	Diminished agricultural production and loss of native flora and fauna and associated habitats.
	<p><b>Causes of the problems</b></p> <p>The above problems are caused by the following:</p> <p><b>Weeds</b></p> <ul style="list-style-type: none"> <li>• Ongoing presence and spread of noxious, agricultural and environmental weed species.</li> <li>• Continuing invasion of weeds from neighbouring properties or roadsides into agricultural land.</li> <li>• Weed competition with pasture species.</li> <li>• Weed invasion of native vegetation areas.</li> </ul> <p><b>Pest animals</b></p> <ul style="list-style-type: none"> <li>• Inadequate/inappropriate control of invasive domestic animals (dogs and cats).</li> <li>• The presence of significant numbers of rabbits. The presence of significant numbers of foxes.</li> </ul> <p>High local populations of some common native species may have an impact on agriculture and/or biodiversity and can be addressed on a case-by case basis if significant detrimental impacts can be demonstrated.</p>
	<p><b>Effects of weeds and pest animals on agriculture and native flora and fauna</b></p> <p>Effects of weed and pest invasions that in turn impact adversely on agriculture and ecological health include the following:</p> <p><b>Weeds</b></p> <ul style="list-style-type: none"> <li>• Potential for adverse animal health issues (e.g. impacts of poisonous or spiny weeds on stock).</li> <li>• Reduced carrying-capacity of pasture, causing reduced animal production.</li> <li>• Competition with and displacement of native vegetation, and associated impacts on ecological communities.</li> <li>• Loss of native fauna habitat</li> </ul> <p><b>Pest animals</b></p> <ul style="list-style-type: none"> <li>• Stock predation.</li> <li>• Competition for existing pasture.</li> <li>• Soil erosion due to lack of ground cover and soil disturbance where pest animals contribute to overgrazing of the land.</li> <li>• Predation of native fauna.</li> <li>• (Sometimes) Loss of native fauna habitat by grazing competition or browsing.</li> </ul>

**Why is this happening?**

The primary causes of the problems include one or more of the following:

**Weeds**

- Lack of knowledge regarding sustainable management techniques that can be adopted to minimise the risk of weed invasion (e.g. rotational grazing).
- Landholders are unaware of the need for and obligations relating to weed control.
- Lack of knowledge/interest regarding weeds management by new and other (e.g. ongoing or absentee) land managers. (For example, landholders cannot identify weeds.)
- Relatively small property sizes increases the difficulty to achieve integrated control on an effective scale.
- Lack of time, financial resources or equipment to carry out control works.
- Inadequate funding available or invested in training and engaging contractors to control roadside weeds.
- Information regarding the spread of weeds via machinery is not getting through to contractors.
- Slashing of roadsides without awareness of or regard for areas of mapped weeds (i.e. results in spread of seeds).

**Pest animals**

- Lack of knowledge by new and other (e.g. some absentee and established) landowners.
- Landholders are unaware (as distinct from lacking knowledge) of problems, and may have other priorities.
- Lack of time, financial resources or equipment to implement pest animal control works.
- Ease of access to grazing and permanent water (e.g. dams and other water sources) for wildlife.
- Landscape conducive to rabbit harbour and susceptible to erosion
- Relatively small property sizes increases the difficulty to achieve integrated control on an effective scale.
- Inadequate control of pest animals by land managers.
- Increase in pest animals due to increase in fresh growth post-fires.
- Inadequate control of domestic cats and dogs.

**PROBLEM DESCRIPTION**

The following actions (individually or collectively) can contribute to achieving the project objectives.

**Weeds****Research and investigation**

- Identify and map weed distribution, and prioritise weeds for control.

**Coordination**

- Engage with Landcare groups.
- Better communication between Council Roadside works and Environmental sections.
- Coordination of weed control measures by landholders.

**Community awareness**

- More public information (e.g. letters and pamphlets for new landholders).
- Rate notice reminder for weed eradication and control (e.g. Blackberry).

**Extension and technical support.**

- Improve landholders' access to professional advice from various agencies.
- Broaden landholders' knowledge (courses/forums).
- Improve contractor knowledge/practices on preventing the spread of weed species (e.g. Chilean Needle Grass).

**Incentives**

- Funding for specialist weed spotters and spraying.
- Use Council's Land Management Incentives program.

**On-ground works**

- Council supervision of contractors to apply vehicle hygiene and earthworks practices that will reduce unintended spread of weeds.
- Landholders employ weed control measures.

**ACTION NEEDS****Pest animals****Research and investigation**

- No actions identified.

**Co-ordination**

- Continue rabbit action groups.
- Continue successful fox and rabbit control programs.
- Need for cooperation and coordination between neighbouring land managers (public and private) to plan and implement pest animal control programs.

**Community awareness**

- Educate new and other (absentee and some established) land owners and occupiers on impacts and responsibilities associated with pet ownership and pest control.

**Extension and technical support**

- Seek advice from professionals (including Shire and agency advisory personnel).
- Council to assist and advise landholders.

**Incentives**

- Use Council's Land Management Incentives program.

**On-ground works**

- Landholders plan and implement 'best practice' pest animal control measures.

**ACTION NEEDS****METHODOLOGY****Methodology for weeds**

- Conduct post-bushfire weed mapping survey to identify weed species and their distribution in the Strathewen catchment.
- Establish criteria for prioritising weeds for control on agricultural land and bush blocks.
- Conduct a community meeting to establish priority weeds and action priorities for weed control.
- Establish coordination procedures between landholders, and between landholders and the Shire.
- Develop and implement community awareness program for responsibilities for weed control.
- Promote best practice and continuous improvement in weed control.

**Methodology for pest animals**

- Continue assistance to rabbit action groups, and continue successful rabbit and fox control programs.
- Establish an awareness program about responsibilities associated with pet ownership.
- Promote best practice and continuous improvement in pest animal control.

**POTENTIAL FUNDING AND RESOURCING***Caring for Our Country 2011-2012*

*Environmental Stewardship Program* – This program gives landholders access to 15-year grants so they can take long-term action on their land to reduce grazing intensity, control weeds and feral animals, and protect key species and ecological communities.  
 Port Phillip and Westernport CMA Community Grants Program.  
 Nillumbik Shire Council Community Rabbit Control Program.  
 Nillumbik Shire Council Landcare Support Grants.  
 Nillumbik Shire Council Community Weed Control Program.

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<b>EXISTING INFORMATION</b>	<p><b>From Literature Review</b> (Figures in brackets indicate the reference number in the Literature Review.)</p> <p><i>Environment Protection and Biodiversity Conservation Act 1999 (3.2.1).</i>  <i>Flora and Fauna Guarantee Act 1988 / Protected Flora list and Action Statements (3.3.1).</i>  <i>Australia's Biodiversity Conservation Strategy 2010 – 2030. (4.2.1).</i>  <i>National Recovery Plan for the Southern Bell Frog 2010 (4.2.5).</i>  <i>Victoria's Resources On-line (4.3.7).</i>  <i>Recovery Plan for Twelve Threatened Spider-Orchid Caladenia R. Br. Taxa of Victoria and South Australia. (4.3.14).</i>  <i>Sites of Faunal and Habitat Significance in NE Melbourne 1997 – the NEROC report (4.4.1).</i>  <i>Port Phillip and Westernport Regional Catchment Management Strategy 2004-2009 (4.4.2).</i>  <i>Port Phillip and Westernport Native Vegetation Plan 2006 (4.4.3).</i>  <i>Nillumbik Weed Action Plan 2008 (5.5.3).</i>  <i>Nillumbik Rabbit Action Plan 2009 (5.3.4).</i>  <i>Roadside Management Plan (5.3.5).</i>  <i>Nillumbik Biodiversity Strategy and Action Plan (5.3.6).</i>  <i>Parks Victoria and Nillumbik Shire Fox Control Program (5.3.8).</i>  <i>Watsons Creek State of the Environment Summary 1999 (6.1.3).</i>  <i>Rabbit Control Program 2009/10 (6.1.6).</i></p>

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<b>PROBLEM DESCRIPTION</b>	<ul style="list-style-type: none"> <li>• The catchment contains locally significant areas of serious tunnel and gully erosion in productive agricultural land.</li> <li>• There is a high risk of erosion occurring more widely on sloping land with low levels of vegetation protection and high run-off.</li> </ul>
	<p><b>Causes of the problems</b></p> <ul style="list-style-type: none"> <li>• Loss of groundcover and increased run-off that in turn cause tunnel and gully erosion damaging agricultural land.</li> <li>• Changing the natural flow of water over the land surface or within waterways. In particular avoid changing broad surface flow into concentrated 'channelized flow' (e.g. along driveways or at dam outfalls).</li> <li>• Topsoil disturbance that provides water with easy access to the dispersible subsoil (this includes inappropriate earthworks, poor grazing techniques, and poor rabbit control).</li> </ul>
	<p><b>Effects of soil erosion</b></p> <ul style="list-style-type: none"> <li>• Loss of productive land and associated production.</li> <li>• Potentially improved conditions for pest animal consolidations (e.g. rabbit warrens and fox dens in eroded banks of gullies and water courses).</li> <li>• Adverse impacts on accessibility across the land.</li> <li>• Sedimentation and turbidity of streams, dams and any wetland areas.</li> <li>• Poor aesthetics.</li> <li>• Adverse impact on property infrastructure and property values.</li> </ul>
	<p><b>Why are the problems happening?</b></p> <p>Soil erosion occurs from one or potentially a combination of some of the following causes:</p> <ul style="list-style-type: none"> <li>• lack of knowledge and awareness of land owners and occupiers about soil properties and the roles of groundcover and deep rooted perennial vegetation in sustainable land use and management.</li> <li>• inappropriate design of drainage disposal for roads, tracks, and dam outfalls to support high energy run-off.</li> <li>• lack of expertise of managers on private and public lands including roads and road reserves in the design and maintenance of roadside cut-off drains.</li> <li>• natural characteristics of the catchment including high run-off from storm events, highly erodible soils.</li> <li>• insufficient advice from agencies.</li> </ul>

## 9.2 Tackling tunnel and gully erosion

<b>PROJECT TITLE:</b> Controlling soil erosion	
<b>GOALS</b>	<p>To stabilise soil erosion in the Strathewen catchment.</p> <p>To improve the awareness and knowledge of landholders about common local soil erosion problems; the cause and prevention and methods to rehabilitate eroded land, to provide for ongoing land and soil stability.</p>
<b>PROJECT OBJECTIVES</b>	<p>To encourage adoption of sustainable practices in all agricultural landscapes by demonstrating:</p> <ul style="list-style-type: none"> <li>• measures to prevent soil erosion.</li> <li>• stabilisation methods for existing eroding sites (gullies, tunnels and roadsides).</li> </ul>
<b>BACKGROUND</b>	<p>The hilly Strathewen landscape is formed on very old sedimentary rock and contains soils that are hard-setting on the surface, and with dispersible clays that are susceptible to erosion when exposed. Much of the steep land remains in forest, while most of the low hills and flats have been cleared for agriculture. The main drainage lines and floodplain areas contain uniform clay profiles. Gully erosion is common in drainage lines where water is concentrated. Erosion hazard is also high where exposed hard-setting surface soils reduce rainfall absorption and increase run-off, and due to the dispersible clay subsoils. Sheet, gully and tunnel erosion occur on sloping land. Erosion of the bed and banks of streams occurs where drainage lines are denuded of protective vegetation.</p>

Continued

<b>METHODOLOGY</b>	<p>The key elements of the methodology are to demonstrate practical erosion control measures in the field, create awareness and knowledge in the Strathewen community about erosion control, and provide incentives for on-ground action.</p> <p><b>Demonstration sites</b></p> <ul style="list-style-type: none"> <li>• Select appropriate gully and tunnel erosion sites for rehabilitation.</li> <li>• Develop a rehabilitation plan for the selected sites and a process for demonstrating site planning for rehabilitation.</li> <li>• Demonstrate the rehabilitation techniques for the common erosion problems in the catchment.</li> </ul> <p><b>Awareness and knowledge</b></p> <ul style="list-style-type: none"> <li>• Conduct field days on catchment management to improve catchment hydrology for prevention of erosion.</li> <li>• Conduct field days at eroded and restored sites to examine and understand the causes, effects and rehabilitation techniques.</li> <li>• Provide easy access to information on prevention and management of soil erosion.</li> <li>• Provide whole farm planning advice and/or courses.</li> </ul> <p><b>Incentives</b></p> <ul style="list-style-type: none"> <li>• Provide incentives through the existing 'Sustainable Agricultural Rebate' offered by Council.</li> </ul>
<b>POTENTIAL FUNDING AND RESOURCING</b>	<p>Melbourne Water, Nillumbik Shire Council, Australian Government (Caring for Our Country), Department of Primary Industries, landholders.</p>

### 9.3 Agricultural futures

<b>PROJECT TITLE:</b> Agricultural futures for Strathewen catchment	
<b>GOAL</b>	<p>To identify potential agricultural enterprises for the future in the Strathewen catchment, as a main basis for continuing sustainable agriculture in the Strathewen catchment area.</p>
<b>PROJECT OBJECTIVES</b>	<p>To develop sufficient information about the agricultural potential of the high quality and strategically important agricultural land in the Strathewen catchment, to enable investment in alternative agricultural enterprises and to support increased productivity.</p> <p>To develop sufficient information about the agricultural potential of the high quality agricultural land in Strathewen to strengthen the case for its protection.</p> <p>To make the information widely available through the Council's rural land use webpage.</p>

Continued

<b>INTRODUCTION</b>	<p><b>Description</b></p> <p>The Strathewen landscape is formed on very old sedimentary rock in a landscape of valleys and predominantly low hills that merge with long ridges of steep hills and rugged terrain particularly on the northern and eastern boundaries. Much of the steep land remains in forest, while most of the low hills and flats have been cleared for agriculture. This agricultural land is in a 'Gently Undulating' Land Management Unit which has shallow light textured gradational soils on the crests and steeper slopes. Grey clay soils with uniform profiles occur along drainage lines and the floodplain.</p> <p>Small areas of the lower slopes (up to 5 per cent gradient) contain high quality agricultural soils with a 9 to 10 month growing season that can extend to 12 months under irrigation. These moderately fertile soils are suited to orchards and potentially other horticulture on the deeper soils. Annual rainfall is approximately 950 millimetres, and the growing season is approximately 8 to 9 months or extended to 12 months if irrigation water is available.</p> <p><b>Rationale</b></p> <p>Strathewen has potential for high yields per hectare on small farming businesses where high quality land management units are located and there is access to water. In such situations greater agricultural diversity could potentially occur including vegetable, fruit, grapes/wine, floriculture, nursery and livestock production.</p> <p>The purpose of this project is to scope the agricultural potential of the Arthurs Creek catchment for increased agricultural diversification and to capitalize on farmers markets. These in turn could attract regional visitors willing to pay premium prices for fresh quality local produce.</p>
<b>PROBLEM DESCRIPTION</b>	<p>The following are considered to be the main general problems for agricultural diversification in the Strathewen catchment:</p> <ul style="list-style-type: none"> <li>• reduced viability of traditional commercial agricultural enterprises</li> <li>• lack of information on alternative enterprises</li> <li>• minimal information or knowledge on soil suitability for agricultural uses and available water resources</li> <li>• experienced farmers leaving their catchment or their industries</li> <li>• many people purchasing rural land without the knowledge and skills required for farming.</li> </ul> <p><b>Effect</b></p> <ul style="list-style-type: none"> <li>• High quality agricultural land and land of strategic importance (i.e. larger productive land parcels) being underutilised.</li> </ul> <p><b>Why is this happening?</b></p> <ul style="list-style-type: none"> <li>• Small properties lack economies of scale.</li> <li>• Land is often purchased for lifestyle purposes, which commands higher land prices than can be justified for commercial agriculture.</li> </ul>

<b>ACTION NEEDS</b>	<p>The following actions (individually or collectively) can contribute to achieving the project objectives.</p> <ul style="list-style-type: none"> <li>• Protect high quality agricultural land, and strategically important agricultural land, from further development.</li> <li>• Identify source, volume and availability of water resources for agriculture.</li> <li>• Develop high resolution soil maps for decision-making on soil suitability for particular agricultural enterprises.</li> <li>• Collate current information on type and value of suitable agricultural enterprises, including their strengths, weaknesses and opportunities.</li> <li>• Take into account the opportunities and threats that climate change and peak oil will have on the development of particular agricultural enterprises.</li> <li>• Identify and elaborate market trends and value-adding that could provide opportunities for small growers.</li> <li>• Publicise alternative farming opportunities.</li> <li>• Provide education and training in production systems, enterprise business practice and farming sustainability.</li> <li>• Support the development of farmers markets.</li> </ul>
<b>METHODOLOGY</b>	<p>The following provides methodology principles that require further refinement together with the chosen actions in developing a detailed proposal for this project.</p> <ul style="list-style-type: none"> <li>• Work with Melbourne Water to identify source, volume and availability of water resources for agriculture.</li> <li>• Develop high resolution soil maps for decision-making on soil suitability for particular agricultural enterprises.</li> <li>• Collate information on type and value of suitable agricultural enterprises, including their strengths, weaknesses and opportunities (i.e. SWOT analysis) and place on Council's rural land use webpage.</li> <li>• Identify and elaborate market trends and value-adding that could provide opportunities for small growers.</li> <li>• Publicise identified alternative farming opportunities in Strathewen.</li> <li>• Provide education and training in production systems, enterprise business practice and farming sustainability for residents interested in investing in alternative agricultural enterprises.</li> <li>• Identify and provide means to support the development or expansion of farmers markets in the Shire of Nillumbik.</li> </ul>
<b>POTENTIAL FUNDING AND RESOURCING</b>	<ul style="list-style-type: none"> <li>• Victorian Government's Farmers Markets Support Program – funding for rural, regional and peri-urban councils to undertake feasibility studies into proposed farmers markets, establish new markets and expand on existing ones.</li> </ul>

## 9.4 Enhancing and promoting habitat links in the Strathewen catchment

<b>PROJECT TITLE:</b> Enhancing and promoting habitat links in the Strathewen catchment	
<b>GOAL</b>	To secure important habitat links by protecting and enhancing remnant native vegetation and connecting core areas.
<b>PROJECT OBJECTIVES</b>	To protect, enhance and restore habitat links. To restore habitat links identified in <b>Figure 4</b> .
<b>INTRODUCTION</b>	<b>Description</b>
	The 1997 report of the former North East Regional Organisation of Councils (NEROC) on significant fauna sites and habitats for north-east Melbourne identifies that the Strathewen catchment supports several habitat links through Arthurs Creek, an east-west habitat link through NEROC area NUH C85, and habitat links from the east and southeast through NEROC area NUH C86. It is considered highly important that these links are protected and enhanced. The Strathewen Landcare Group has also implemented some biolinks on private land.
<b>PROJECT DESCRIPTION</b>	<b>Problems</b>
	Historic loss of important habitat links. On-going loss of scattered trees and understorey vegetation on agricultural land. Increased threat of degradation of remnant vegetation by weeds and pest animals.
<b>PROJECT DESCRIPTION</b>	<b>Causes/Why this is happening?</b>
	The primary causes for loss and fragmentation of habitat links include: <ul style="list-style-type: none"> <li>• overgrazing on agricultural land</li> <li>• lack of protection of native vegetation</li> <li>• lack of understanding of biodiversity values</li> <li>• lack of knowledge of the importance of native vegetation and responsibilities under the Planning Scheme relating to removing, destroying or lopping native vegetation</li> <li>• inappropriate development that can restrict the movement of fauna (e.g. wildlife unfriendly fencing)</li> <li>• reduced property sizes, increased urbanization and human population pressure causing greater ecological threat/disturbance and making it harder to implement positive ecological projects on a landscape scale.</li> </ul>
<b>PROJECT DESCRIPTION</b>	<b>Effects</b>
	Deterioration and fragmentation of regional and local habitat links including loss of: <ul style="list-style-type: none"> <li>• canopy for movement of some fauna species across open paddocks</li> <li>• canopy and understorey vegetation for safe movement of native fauna</li> <li>• The quantity, quality and connectivity of remnant vegetation</li> <li>• landscape values</li> <li>• Indigenous flora and fauna.</li> </ul>

<b>ACTIONS NEEDED</b>	<p><b>Research and investigation</b> Analyse the recommendations made in the ABZECO mapping (<b>Figure 10</b>) for guidance on restoration priorities in conjunction with community engagement.</p> <p><b>Coordination</b> Council to ensure that landholders are aware of ecological values on their properties and understand their responsibilities to maintain native vegetation and the benefits of linking core areas.</p> <p><b>Community awareness</b> Implement program to enhance community education and capacity to retain and regenerate native vegetation.</p> <p><b>Extension and technical support</b> To be provided by Nillumbik Shire Council and external consultants where required.</p> <p><b>Incentives</b> Landholders adequately managing their land may be eligible for the Nillumbik Shire Council Land Management Incentive Program.</p> <p><b>On-ground works</b> Implement fencing around remnant vegetation where possible. Fence off areas that can act as corridors to link core areas of native vegetation. Implement revegetation in areas where natural regeneration is not adequate.</p>
	<p><b>METHODOLOGY</b></p> <p>Analyse the recommendations made in the ABZECO mapping (<b>Figure 10</b>) for guidance on restoration priorities in conjunction with community engagement.</p> <p>Establish a program to enhance community education and capacity to retain and regenerate native vegetation.</p> <p>Fence off areas that can act as corridors to link core areas of native vegetation.</p> <p>Fence around remnant vegetation where possible, and other areas where natural regeneration is not adequate.</p>
<b>POTENTIAL FUNDING PROGRAMS</b>	<p>One example of a potential funding source is the Australian Government 'Caring For Our Country' program.</p> <p>In 2012, funding was obtained through the Victorian Government's Communities for Nature grant program. The grant provides \$600,000 over four years for Landcare Groups to work on threatened species projects across the Shire.</p> <p>Where habitat links are proposed along river frontage, Melbourne Water is a potential funding source through its water quality improvement programming.</p>

## 9.5 Best practice native pasture management on hill country

<b>PROJECT TITLE:</b> Best practice native pasture management on hill country	
<b>GOAL</b>	To increase the content and pasture yield of native perennial grass species in pastures on Moderately Undulating and Steep Land Management Units in the Strathewen catchment (Agricultural Land Quality classes 3-4).
<b>LOCATION</b>	Agricultural land on the Moderately Undulating and Steep Land Management Units in the Strathewen catchment is identified in ' <b>Figure 6</b> – Map: Strathewen Agricultural Land Quality' in the Community Environmental Recovery Action Plan – Strathewen Catchment (2011) as Classes 3 and 4. (A landholder property for the demonstration project is yet to be determined.)
<b>PROJECT DESCRIPTION</b>	<p>Most hill country in the Strathewen catchment contains native pasture species. Much of this is depleted or not achieving its productive potential.</p> <p>Native grass species can contribute to the stability of pasture production because many have an active growing season beyond that of annual grasses and many introduced perennial pasture species. A good quality dense stand of actively growing perennial grasses provides a continuous food supply for stock and gives sound protection against soil degradation and weed invasion.</p> <p>The main native grass species contributing to pastures in the Strathewen catchment include: Kangaroo grass (<i>Themeda triandra</i>), Wallaby grass (<i>Austrostipa spp</i>), Weeping grass (<i>Microlaena stipoides</i>) and Spear grass (<i>Austrostipa spp</i>).</p> <p>Each perennial grass species has its own pattern of seeding, germination and growth and will respond differently to the timing and length of rests, height of grazing, competition and shading. While it isn't possible to cater for all characteristics of every species in a diverse native pasture, understanding the differences of the more common species allows managers to maintain or improve the composition of their pasture by making informed choices of how and when to graze and rest pastures to favour desirable species over undesirable species.</p> <p>There is no set recipe for managing native pastures, but some basic principles apply to all perennial-based pastures. The key is to have a flexible system that can be changed as the season, pasture species and stock require. In this demonstration management decisions should consider the:</p> <ul style="list-style-type: none"> <li>• effect of grazing on the ability of the desired perennial plants to survive and facilitate recruitment.</li> <li>• effect of percentage pasture cover on the rate of soil erosion</li> <li>• need for seeding opportunities to allow recruitment and replenishment of soil seed bank.</li> <li>• likely benefit of diversity of species on drought tolerance</li> <li>• effect of overgrazing or lack of rotation on pasture/weed composition</li> <li>• benefits of periodic resting via the use of rotational grazing practices.</li> </ul> <p>As poor rotation and overstocking is a major cause of native pasture degradation, the most important principle is that stocking rates and rotations need to match to the forage availability, which will vary seasonally and between years.</p>

<b>PROJECT DESCRIPTION</b>	<p>The growth and health of plants relies primarily on obtaining solar energy and hence they need enough leaves (as energy receptors) and underground roots (for energy storage) as possible. Hence recovery time between bouts of grazing is very important. When grazed short, the leaf area is reduced and plants need to rely on energy stores to re-grow. Rotational grazing and resting of pastures needs to be timed to the growth of the plants and not on a set time basis. Conversely, not grazing or only lightly stocking perennial grasses allows them to become rank and unpalatable, reducing their grazing value.</p> <p>This demonstration project should extend over five years to demonstrate the benefits of best practice. It should incorporate the development of a Property/Whole Farm Plan that fully integrates all aspects of sustainable and productive land management. It will demonstrate best practice in managing native species-based pastures on Strathewen hill country by highlighting:</p> <ul style="list-style-type: none"> <li>• rotational grazing and stocking rate practices that favour the reproductive and growth processes of native grasses and increase their density and yield</li> <li>• weed and rabbit control</li> <li>• soil conservation measures.</li> </ul>
	<b>Problems</b>
	<p>In many instances continuing infestation of pasture weeds and invasion of noxious weeds has damaged the resilience and yield of native pastures, reducing carrying-capacity and animal production and increasing bare ground. Stocking rates that are too high can improve the competitiveness of inferior species and reduce the population of pasture species (native or introduced), with a consequential reduction in carrying-capacity of pasture and animal production.</p> <p>The impact of weed invasion and inappropriate grazing including overgrazing by stock, rabbits and kangaroos has depleted the density and total content of native species and reduced groundcover. This causes increased run-off, soil erosion, compaction, loss of fertility and acidification, and damage to stock water storages and water quality.</p> <p>In summary, key problems associated with maintaining the content and range of native species and productivity of native pastures species are:</p> <ul style="list-style-type: none"> <li>• grazing management that does not favour seed-setting and regeneration and the plant vigour of mature native species</li> <li>• increased weed infestation through overgrazing by livestock, rabbits, and kangaroos</li> <li>• soil erosion.</li> </ul>
	<b>Why is this happening?</b>
	<p>The recent decade of drought and the 2009 fires, and the consequent higher grazing pressure of stock and rabbits on drought affected pasture, have reduced native grass density, vigor and yield. This has allowed invasion of weeds and inferior annual pasture species. Lack of ground cover has led to high run-off off hard-setting soils causing flooding and soil erosion.</p>

<b>METHODOLOGY</b>	<p>This five-year project will demonstrate best practice sustainable pasture management of perennial native grass species on hill country in the Strathewen catchment.</p> <p>This practical demonstration will meet the sustainable needs of the pasture and the economics of the farm business. The methodology will be generally based on 'deferred' (rotational) grazing systems aimed at providing economic and environmental benefits for hill country. Depending on the condition of the selected demonstration site, any of the following research-tested systems could be chosen to make the most of native grasses.</p> <ul style="list-style-type: none"> <li>• <b>Optimised deferred grazing</b>, based on grazing at key times in the life cycle of pasture plants, is one of the most effective ways to change pasture composition. This aims to increase total perennial grass population and dry matter production while suppressing annual grasses and weeds.</li> <li>• <b>Short-term deferred grazing</b>, with stock excluded from October to mid-summer. This aims to increase soil seed reserves and plant population density but without altering pasture composition as effectively as optimised deferred grazing.</li> <li>• <b>Long-term deferred grazing</b>, with stock excluded from October to autumn break, and timed grazing, with a resting period of 120 to 130 days after each grazing. This aims to build up the soil seed reserves, restore groundcover and recruit new plants where native perennial grasses contribute only 5 to 20 per cent of desirable species.</li> <li>• <b>Strategic deferred grazing</b>, which combines optimised deferred grazing with fertiliser and weed management. This aims to alter pasture composition and lift perennial grass yield.</li> </ul>
<b>PROJECT TEAM</b>	<p>A project team is required with responsibility for developing the work program for the site selection, choice of grazing system in consultation with the implementing land manager, the project budget, and the securing of funding. The project team should include representation from farming members of the Strathewen community, an extension agronomist (DPI) and NERWG.</p>
<b>FUNDING</b>	<p>Funding will be required over the five-year demonstration to cover the following (cost figures are indicative):</p> <ul style="list-style-type: none"> <li>• Set-up costs potentially comprising fencing and water supply material for further subdivision of the demonstration site – \$10,000 in year one.</li> <li>• Field extension activities and publicity. (These would rely on volunteers to organise, but costs would occur for publicity and documentation/publishing) - \$1,000 per year.</li> <li>• Monitoring measures including documentation of grazing practices, measuring change in native grasses' density and yield, weed content and percentage bare ground. (This would rely on volunteers, but some instruments will need to be purchased.) - \$1,000 per year.</li> <li>• Final documentation and publishing of the results - \$5,000 after year five.</li> </ul>
<b>MONITORING AND REPORTING</b>	<p>Over a five-year period there should be:</p> <ul style="list-style-type: none"> <li>• Measurable change in the contribution of native perennial grass species to the pasture in terms of contribution to percentage ground cover, and a reduction in the weed component and in bare ground. Measure using photography and random visual estimates of percentage ground cover contributed by each species.</li> <li>• Seasonal extension activities at the demonstration site, recording number of activities and number of local land managers attending.</li> <li>• Publication of results (including yearly interim results) to promote best practice for hill country grazing in Strathewen.</li> </ul>

## 9.6 Native paddock trees: protecting an important resource

<b>PROJECT TITLE:</b> Native paddock trees, protecting an important resource	
<b>GOAL</b>	To enhance native vegetation and fauna through the protection of scattered native paddock trees and establishment of regeneration from them.
<b>PROJECT DESCRIPTION</b>	Native scattered paddock trees provide important ecological values and should be protected where possible. Pastures with scattered paddock trees support a greater diversity and abundance of birds, reptiles, invertebrates and plants. Scattered trees also provide a stepping stone for animal movement between patches of native vegetation and provide value to stock through shade and shelter. The Strathewen catchment supports areas of grazing land with scattered paddock trees. Without protection and allowing for some of these trees to regenerate these resources will eventually be lost. One property is being used as a demonstration project to show how paddock trees can be protected and allowed to regenerate. Key activities will be: <ul style="list-style-type: none"> <li>• fencing of mature paddock trees</li> <li>• protection of scattered sapling</li> <li>• natural regeneration to a point where saplings are robust enough to endure cattle.</li> </ul>
	<b>Problems</b>
	Without protection, scattered native paddock trees will eventually be lost from agricultural areas. This will impact on native fauna that use paddock trees as habitat and stepping stones between habitat areas.
	<b>Causes/Why this is happening</b>
	Constant grazing by stock means that existing paddock trees will not be replaced. Also any seedlings that do emerge are likely to be grazed.
	<b>METHODOLOGY</b>
	<p><b>Existing trees</b></p> <p>Five paddock trees will be selected across the property for protection. To allow enough space for adequate natural regeneration an area twice the canopy will be fenced as per the Victorian DSE's Guide for Assessment of referred planning applications (DSE 2007). Fences will be constructed from pre-fabricated Quikfence. This type of fencing can be moved once regenerating seedlings have reached a size resilient to cattle. A solar panel powering a single hot wire around each fence will be installed. It is anticipated that the fences will remain in place for approximately five years. They can then be reused for new trees.</p> <p>Weed control will be regularly maintained for any invasive species that appear in the fenced areas.</p> <p><b>Existing seedlings</b></p> <p>Any existing seedlings can be protected through installing guards until they are mature enough to be resilient to cattle.</p>

Continued		
	<b>Outputs</b>	<b>Estimated Cost</b>
<b>PROJECT DESCRIPTION</b>	• 25 by 25 metre fence around five trees.	To come.
	• Guards around 50 saplings.	\$600
	<b>TOTAL COST</b>	To be determined
<b>PROJECT TEAM</b>	A project team with representation from landholders and the Strathewen catchment will be required. The team will be responsible for developing the work program in collaboration with the landholder.	
<b>POTENTIAL FUNDING PROGRAMS</b>	The Victorian Government Communities for Nature grants may be suitable for this project.	
<b>MONITORING AND REPORTING</b>	<p>Monitoring and reporting would be through the completion of the proposed targets over five years.</p> <p><b>Year 1 Measures of success</b></p> <ul style="list-style-type: none"> <li>• Fencing installed around five trees.</li> <li>• Weld mesh guards installed around 50 seedlings.</li> </ul> <p><b>Year 3 Measures of success</b></p> <ul style="list-style-type: none"> <li>• Natural regeneration occurring within fenced areas. Assess whether planting of seedlings may be required.</li> </ul> <p><b>Year 5 Measures of success</b></p> <ul style="list-style-type: none"> <li>• Seedlings within fenced areas are robust enough to have fencing removed.</li> </ul>	
<b>REFERENCES</b>	<p>Department of Sustainability and Environment (2007) Native Vegetation Guide for assessment of referred planning permit applications. Victorian Government, Department of Sustainability and Environment, East Melbourne.</p> <p>Melbourne Water 2007. River Reflections. Melbourne Water River Health Grants Program Newsletter. Edition 2, June 2007.</p>	

# 10. Monitoring and Reporting

This CERAP is a living document, intended to provide ongoing use to the Strathewen community in guiding sustainable catchment management. In time, as the Strathewen CERAP is implemented, the condition of the catchment will change. Some actions will no longer be necessary or will need to be revised, and new actions will become useful and important. Research into the ecology of the Strathewen area, and innovation in catchment management, will play a role in this.

Accordingly, the CERAP should be reviewed every five years in order to revise its vision and goals, assess and revise its current list of actions and develop new actions. Community input will be vital to this process.

The following key principles will be taken into account when conducting the review of the Strathewen CERAP:

- be relevant and useful for all partners and stakeholders
- be simple, cost-effective, affordable and practical by:
  - avoiding duplication of effort
  - using data for multiple purposes
  - ensuring that users can obtain the data
  - ensuring that users can easily find out whether suitable data already exists
- recognise that catchment management outcomes occur over a range of time-scales (often outside funding periods)
- recognise that most targets set within the first five years will represent only the earliest stages of progress towards remedying key catchment issues.
- allow meaningful interpretation of data over time
- specify assumptions within strategies and decision-making processes.



Photo by Celeste Geer

# Appendices

## Appendix 1: Significant flora and fauna records within the Strathewen CERAP area

### A3.1 Significant flora recorded within Strathewen

Common Name	Scientific Name	EPBC Listing	VROT Listing	FFG Listing	Last Record	Number of Records	Habitat
<b>STATE SIGNIFICANT</b>							
Creeping Grevillea	<i>Grevillea repens</i>	-	Rare	-	2000	3	Dry well drained clay loam soils in drier heathy forests. Frost tolerant. Semi-shade to dappled shade. Limited to a small area within the Shire. Endemic to Victoria.
Large-leaf Cinnamon Wattle	<i>Acacia leprosa</i> (large phyllode variant)	-	Rare	-	2006	3	Occurs in dry forests and prefers semi-shade. Likes moist, well drained soils.
Southern Varnish Wattle	<i>Acacia verniciflua</i> (southern variant)	-	Poorly known	-	1968	1	Tolerates wet and dry conditions, found in damp and valley sclerophyll forests and grassy open forests.

### A3.2 Significant fauna recorded within Strathewen

Common Name	Scientific Name	EPBC Listing	VROT Listing	FFG Listing	Last Record	Number of Records	Habitat
<b>NATIONALLY SIGNIFICANT</b>							
Growling Grass Frog	<i>Litoria raniformis</i>	Vulnerable	Endangered	Listed	1992	2	In water or very wet areas in woodlands, shrublands, and open and disturbed areas.
<b>STATE SIGNIFICANT</b>							
Speckled Warbler	<i>Pyrrholaemus sagittatus</i>	-	Vulnerable	Listed	1990	20	A wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies.
Lace Goanna	<i>Varanus varius</i>	-	Vulnerable	Listed	2005	8	Rainforests, wet sclerophyll forests, woodland and coastal scrub.
Powerful Owl	<i>Ninox strenua</i>	-	Vulnerable	Listed	2006	6	Drier forest types which have many live hollow bearing eucalypt trees
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	-	Vulnerable	Listed	2006	5	Open dry foothill forest with little ground cover, typically associated with box, ironbark and stringybark eucalyptus.

### A3.2 Significant fauna recorded within Strathewen

Common Name	Scientific Name	EPBC Listing	VROT Listing	FFG Listing	Last Record	Number of Records	Habitat
<b>STATE SIGNIFICANT</b>							
Barking Owl	<i>Ninox connivens</i>	-	Endangered	Listed	1992	5	Open woodlands and forest edge habitats where forests adjoin farmlands.
Spotted Quail-thrush	<i>Cinclosoma punctatum</i>	-	Near Threatened	-	1990	4	Sclerophyll woodlands dominated by Eucalyptus trees and have sparse understorey vegetation
Chestnut-rumped Heathwren	<i>Calamanthus pyrrhopygius</i>	-	Vulnerable	Listed	1990	4	Dense heathland and undergrowth in Eucalyptus forests and woodlands, and is most commonly found in rocky areas.
Brown Treecreeper (south-eastern ssp.)	<i>Climacteris picumnus victoriae</i>	-	Near Threatened	-	1999	3	Occurs in eucalypt forests and woodlands.
Pied Cormorant	<i>Phalacrocorax varius</i>	-	Near Threatened	-	1979	3	Marine habitats, including estuaries, harbours and bays. Also found on large inland wetlands.
Common Dunnart	<i>Sminthopsis murina</i>	-	Vulnerable	-	1990	2	Open forests, woodlands and heathland areas.
Nankeen Night Heron	<i>Nycticorax caledonicus</i>	-	Near Threatened	-	1976	2	Well-vegetated wetlands, and is found along shallow river margins, mangroves, floodplains, swamps, and parks and gardens.
Intermediate Egret	<i>Ardea intermedia</i>	-	Critically Endangered	Listed	1979	2	Wetlands and swamps.
Mountain Galaxias	<i>Galaxias olidus</i>	-	-	Listed	1992	1	Usually in clear flowing streams with a sand, gravel or boulder bottom.
Black-eared Cuckoo	<i>Chrysococcyx osculans</i>	-	Near Threatened	-	1990	1	Dry open woodlands, eucalypt forests and shrublands and vegetation along creek beds.
Hooded Robin	<i>Melanodryas cucullata</i>	-	Near Threatened	Listed	1990	1	Eucalypt tall open forests and Acacia shrublands.

### A3.2 Significant fauna recorded within Strathewen

Common Name	Scientific Name	EPBC Listing	VROT Listing	FFG Listing	Last Record	Number of Records	Habitat
<b>STATE SIGNIFICANT</b>							
Southern Toadlet	<i>Ninox connivens</i>	-	Vulnerable	-	1990	1	Lower elevations in damp areas usually under leaf litter, logs or rocks.
Azure Kingfisher	<i>Cinclosoma punctatum</i>	-	Near Threatened	-	1991	1	Aquatic habitats such as well vegetated streams where waters are slow flowing. Also inhabit billabongs, lakes, swamps, lagoons and dams.
Bearded Dragon	<i>Calamantus pyrrhopygius</i>	-	Data Deficient	-	1990	1	Open forests, heathland, scrub and even some disturbed areas such as farmland.
Eastern Great Egret	<i>Climacteris picumnus victoriae</i>	-	Vulnerable	Listed	1977	1	Wide range of wetland habitats.
Grey Goshawk	<i>Phalacrocorax varius</i>	-	Vulnerable	Listed	1977	1	Most forest types, especially tall closed forests, including rainforests.
Hardhead	<i>Sminthopsis murina</i>	-	Vulnerable	-	1976	1	Freshwater swamps and wetlands and occasionally in sheltered estuaries.
Masked Owl	<i>Nycticorax caledonicus</i>	-	Endangered	-	1990	1	A range of habitats from wet sclerophyll forest, dry sclerophyll forest, non eucalypt dominated forest, scrub and cleared land with remnant old growth trees.
White-footed Dunnart	<i>Ardea intermedia</i>	-	Near Threatened	Listed	1974	1	Forest and woodland cover of more than 50% heath understory or mid-story plant species. Other habitats include coastal tussock grasslands, sedgeland and wet heath.
<b>Total</b>						<b>77</b>	



Photos by Elena Tozer



Figure 2

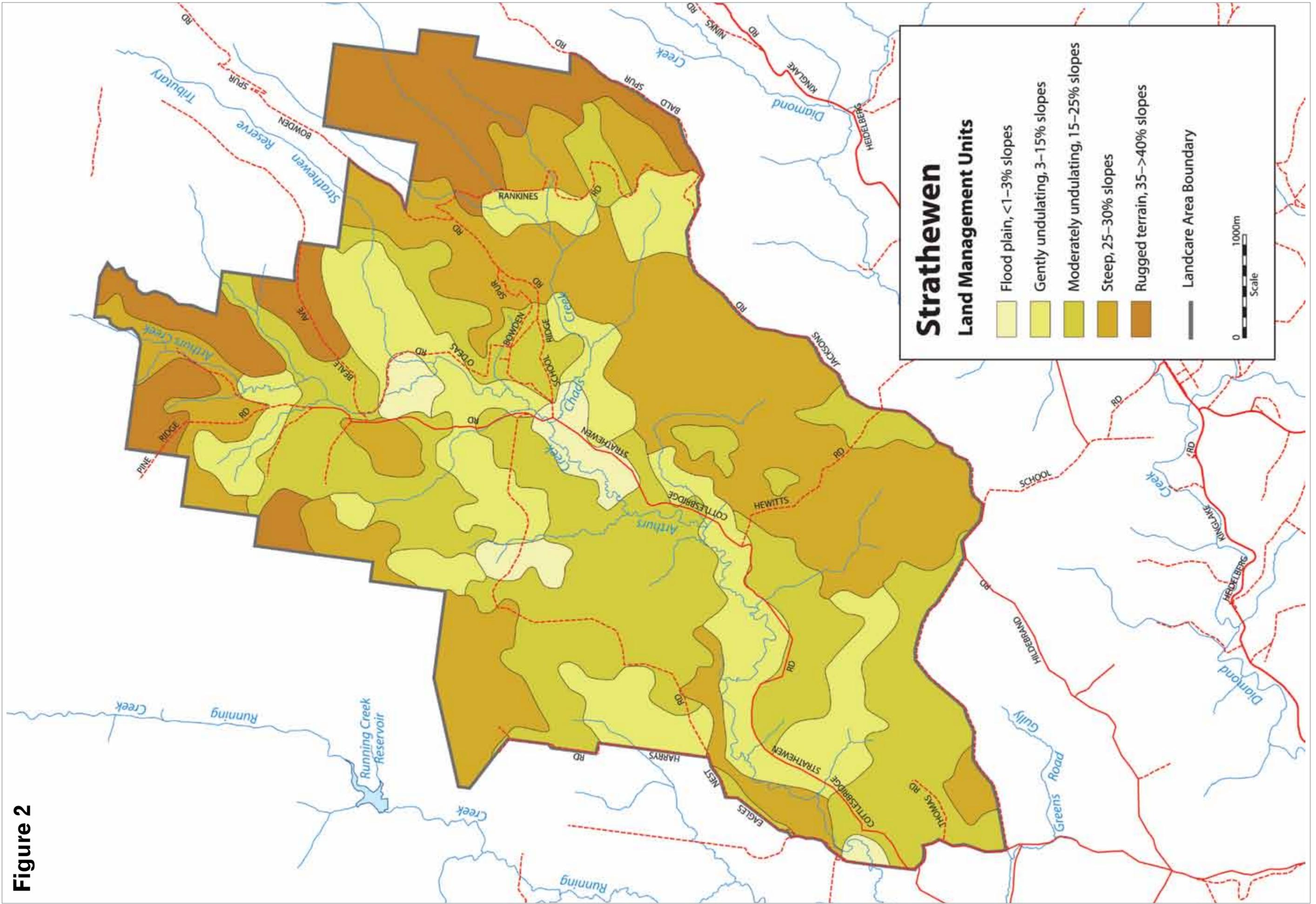


Figure 3

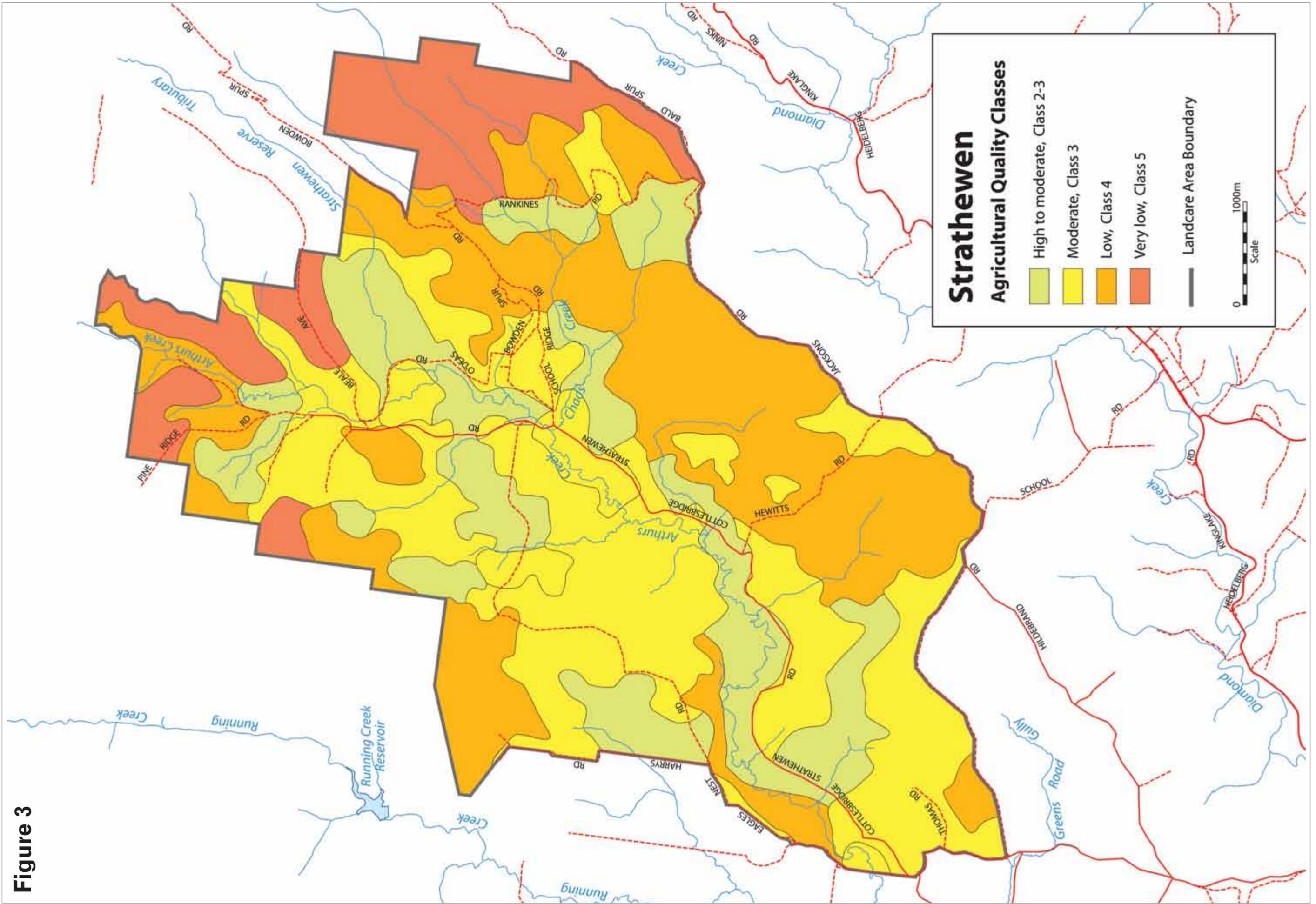


Figure 4

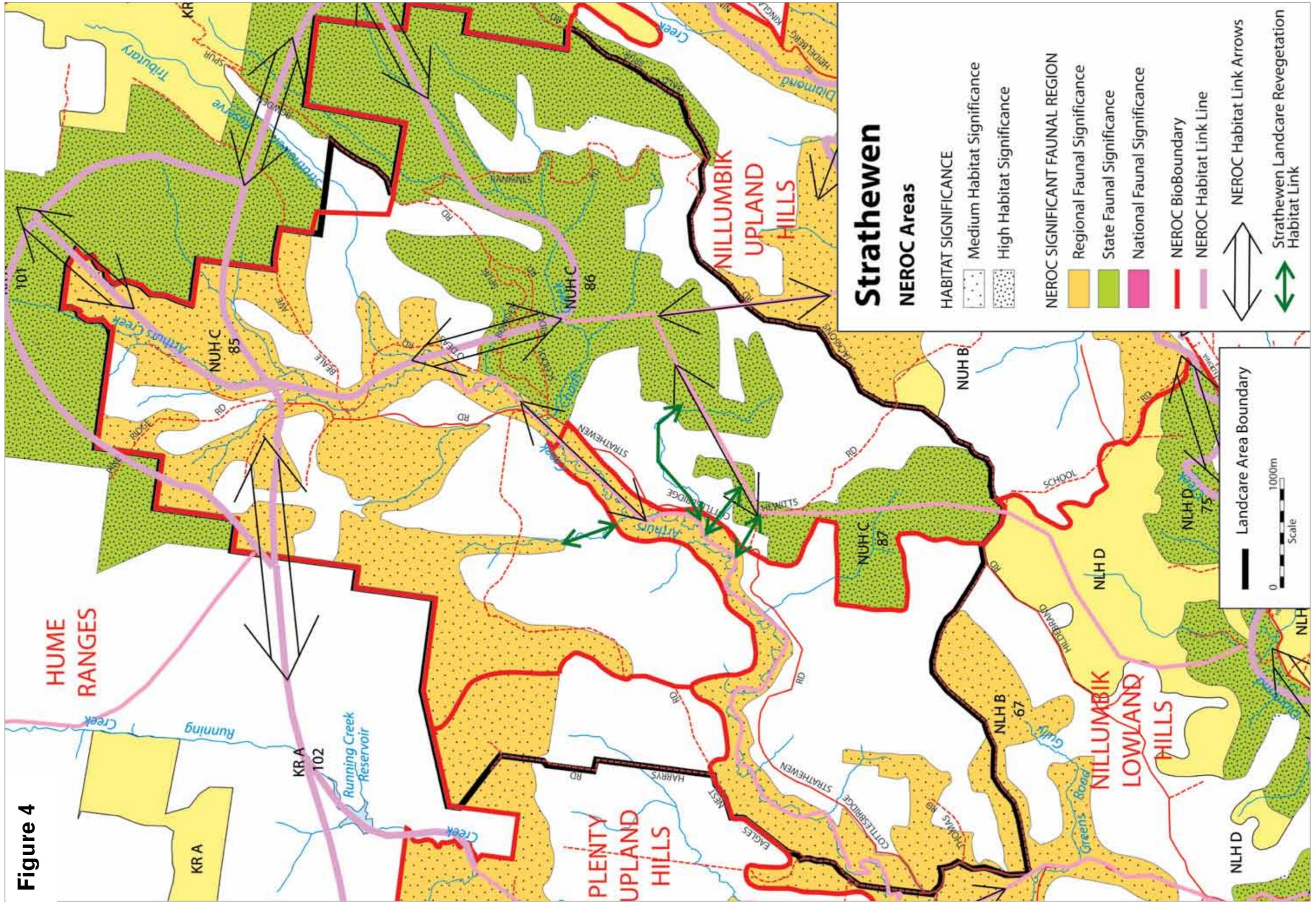


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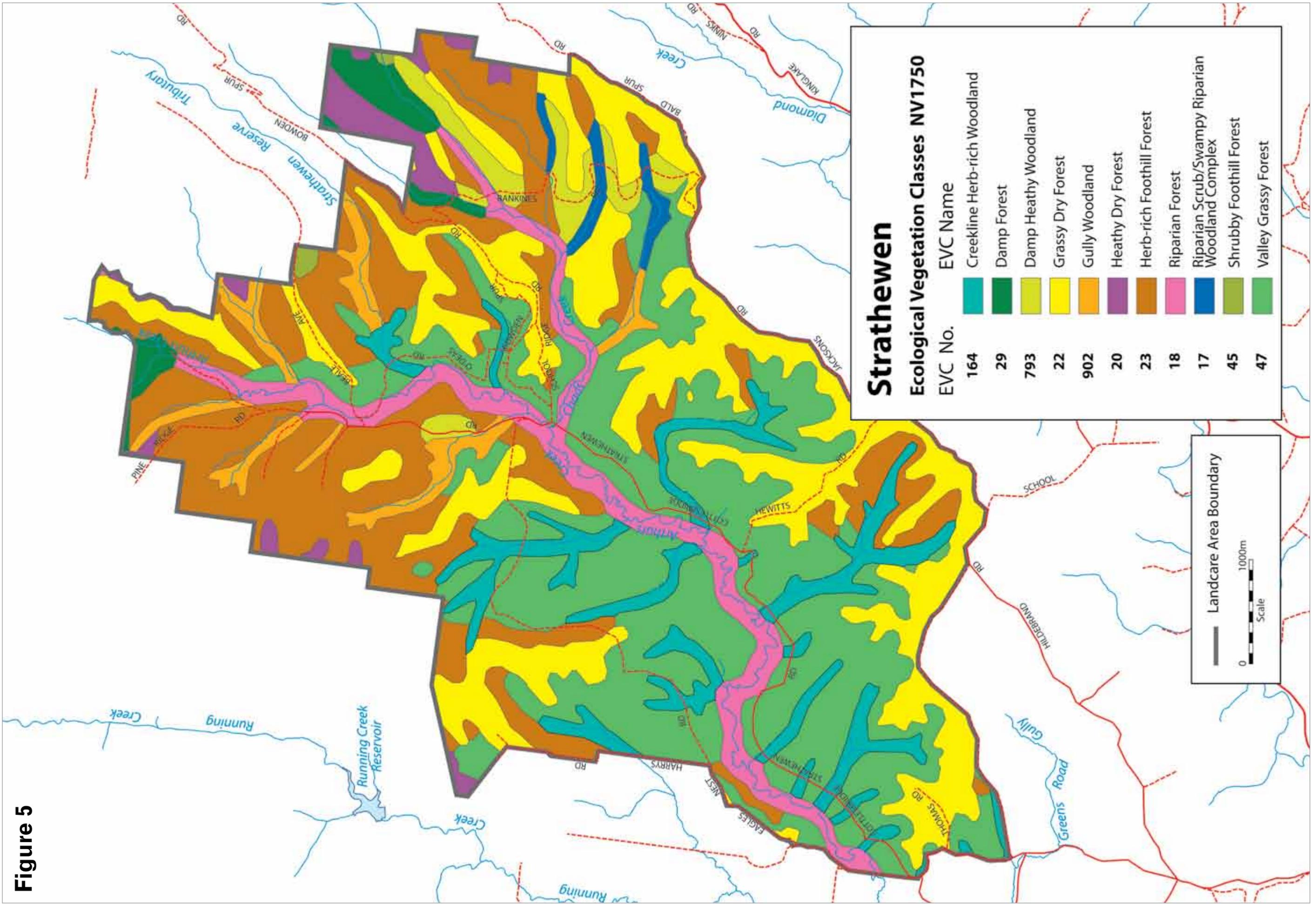


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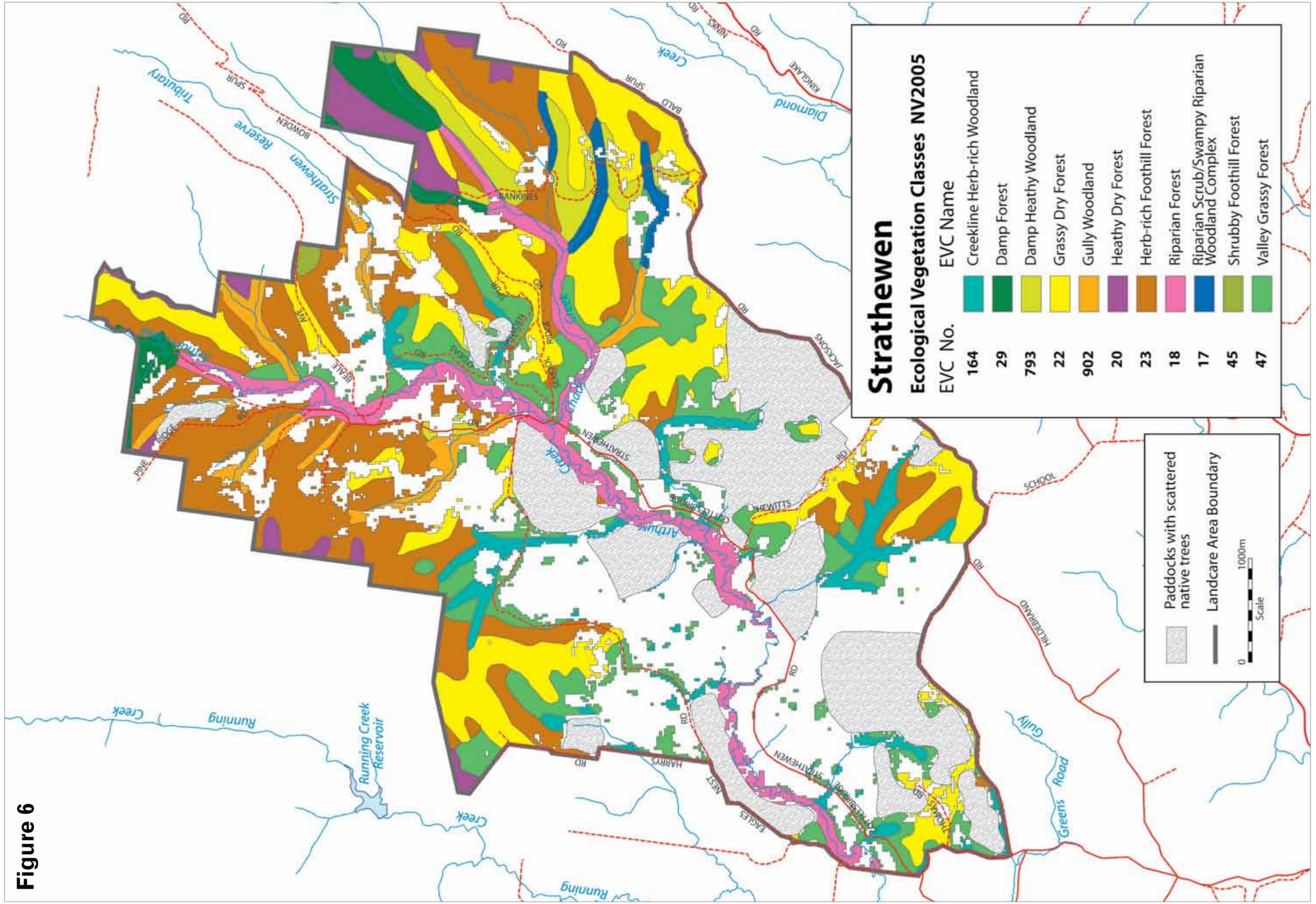


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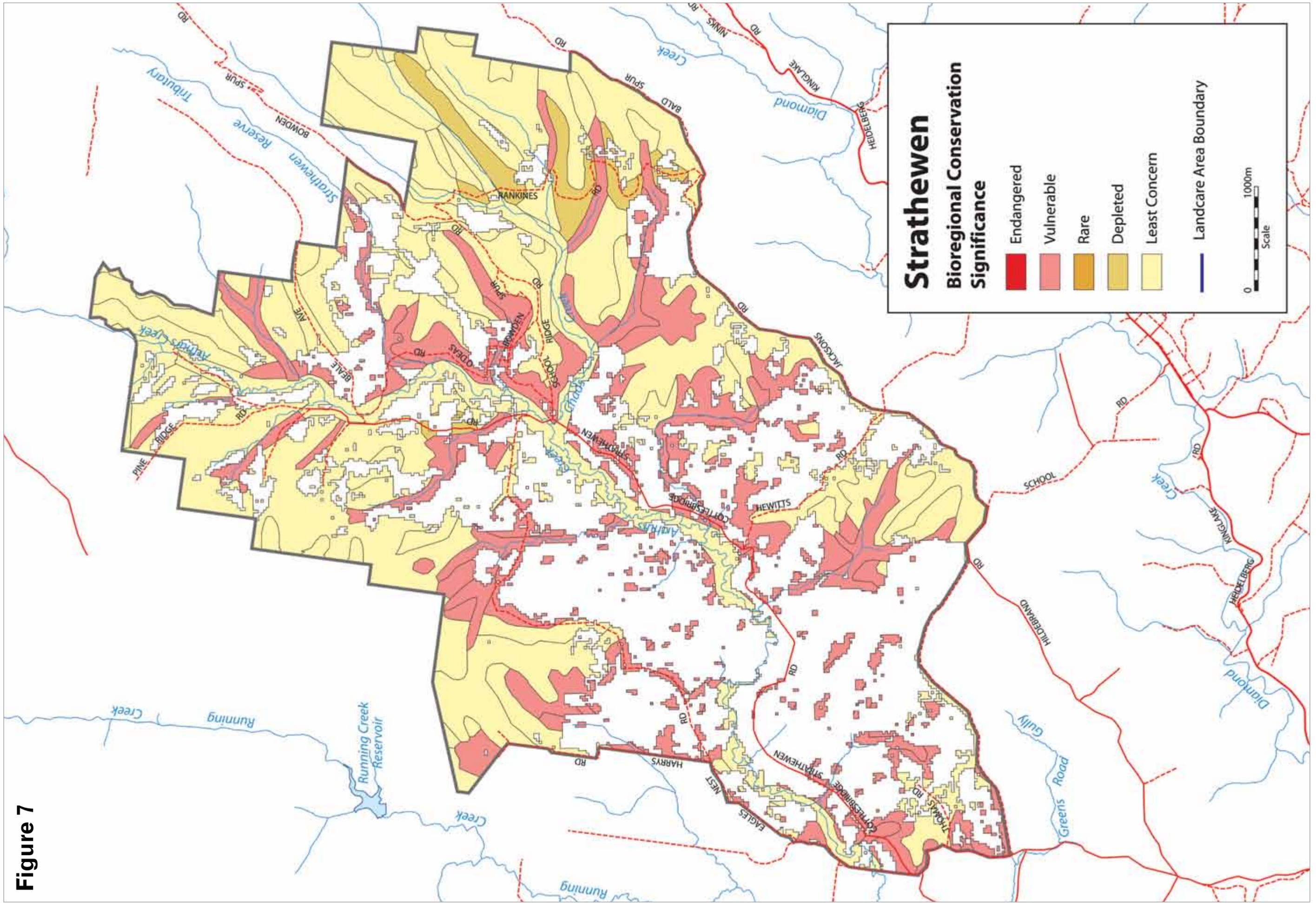
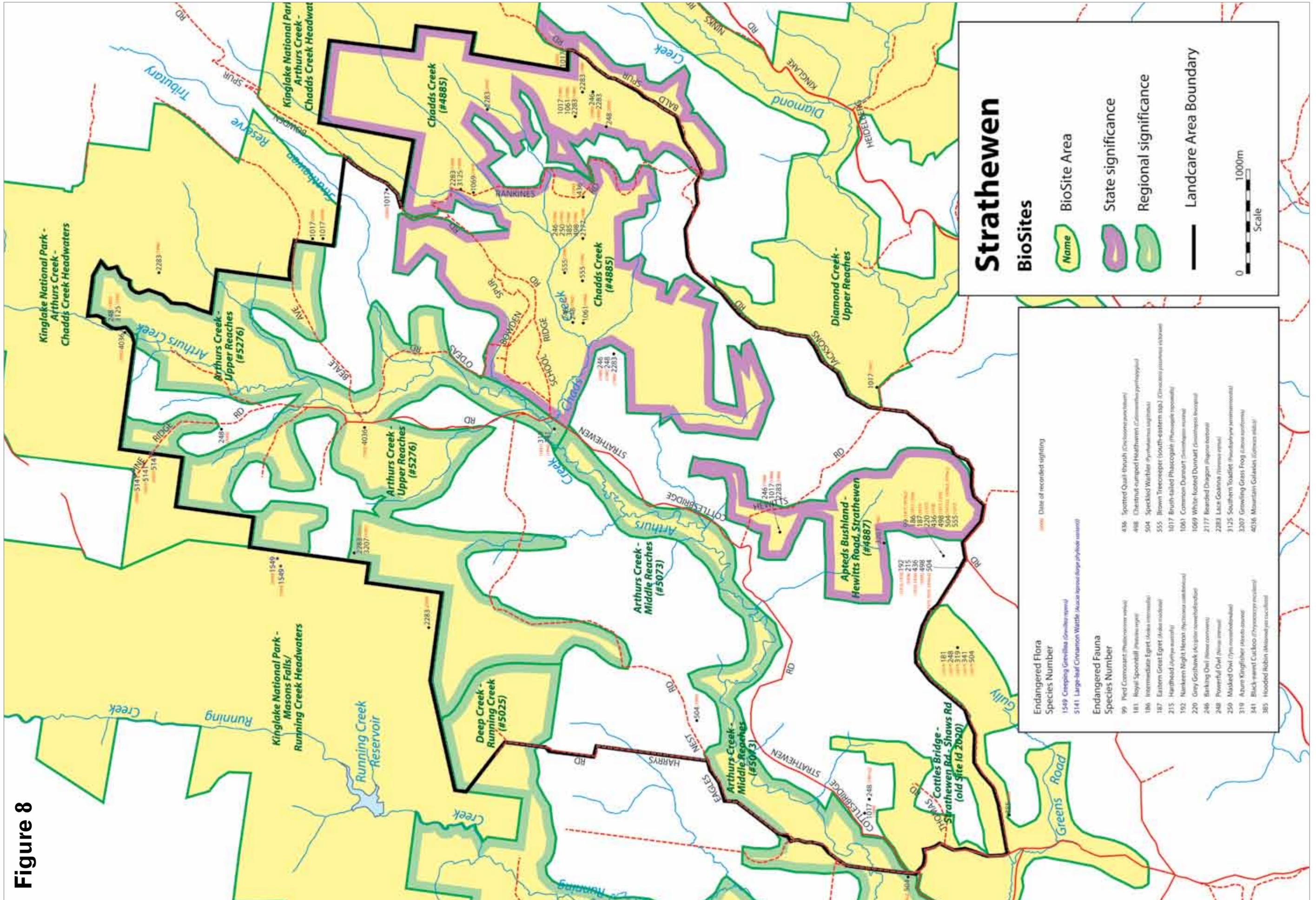


Figure 8



Species Number	Species Name	Date of record/recent sighting
1549	Creeping Greivillia ( <i>Greivillia repens</i> )	
5141	Large-bill Cinnamon Wattle ( <i>Acacia lipoides</i> large phyloids variant)	
<b>Endangered Fauna</b>		
99	Red Cuckoo-shrike ( <i>Phalaropus lobatus</i> )	
181	Royal Spoonbill ( <i>Platyrhynchos royali</i> )	
186	Intermediate Egret ( <i>Egretta intermedia</i> )	
187	Eastern Great Egret ( <i>Ardea herodias</i> )	
215	Hardhead ( <i>Myiopsitta alberti</i> )	
192	Northern Night Heron ( <i>Nycticorax nycticorax</i> )	
220	Grey Goshawk ( <i>Accipiter novaehollandiae</i> )	
246	Barking Owl ( <i>Ninox connexa</i> )	
248	Powerful Owl ( <i>Ninox novaeseelandiae</i> )	
250	Masked Owl ( <i>Ninox novaeseelandiae</i> )	
310	Azura Kingfisher ( <i>Halcyon novaeseelandiae</i> )	
341	Black-eyed Cuckoo ( <i>Ptilinopus melanotus</i> )	
385	Hooded Robin ( <i>Melanodryas cucullata</i> )	
436	Spotted Quail Thrush ( <i>Circus melanoleucos</i> )	
498	Chestnut-rumped Heathwren ( <i>Crithopsis pyrrhopygia</i> )	
504	Speckled Warbler ( <i>Pyrulanius sagittatus</i> )	
555	Brown Treecreeper (south-eastern sp.) ( <i>Climacteris parvirostris</i> subsp.)	
1017	Bush-tailed Phascogale ( <i>Phascogale tapoatawa</i> )	
1069	Common Dunnart ( <i>Sminthopsis macrura</i> )	
1069	White-footed Dunnart ( <i>Sminthopsis lewini</i> )	
2177	Bearded Dragon ( <i>Pogona barbata</i> )	
2283	Lake Goanna ( <i>Hemisaurus</i> )	
3125	Southern Toadlet ( <i>Rhombophryne pinnimaculata</i> )	
3207	Grimwelling Grass Frog ( <i>Lanales nebulosa</i> )	
4036	Mountain Galaxias ( <i>Galaxias olidus</i> )	

Figure 9

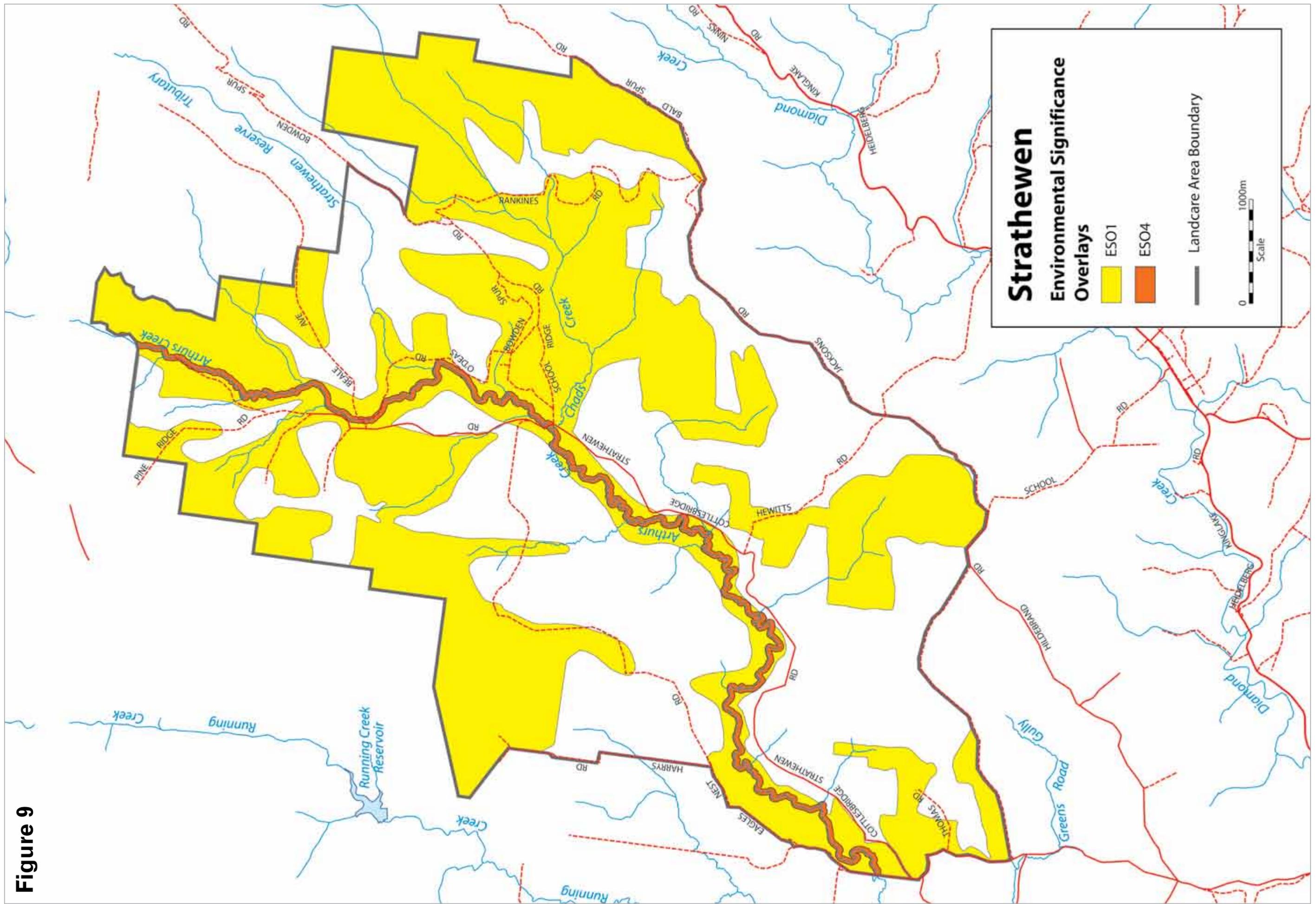


Figure 10

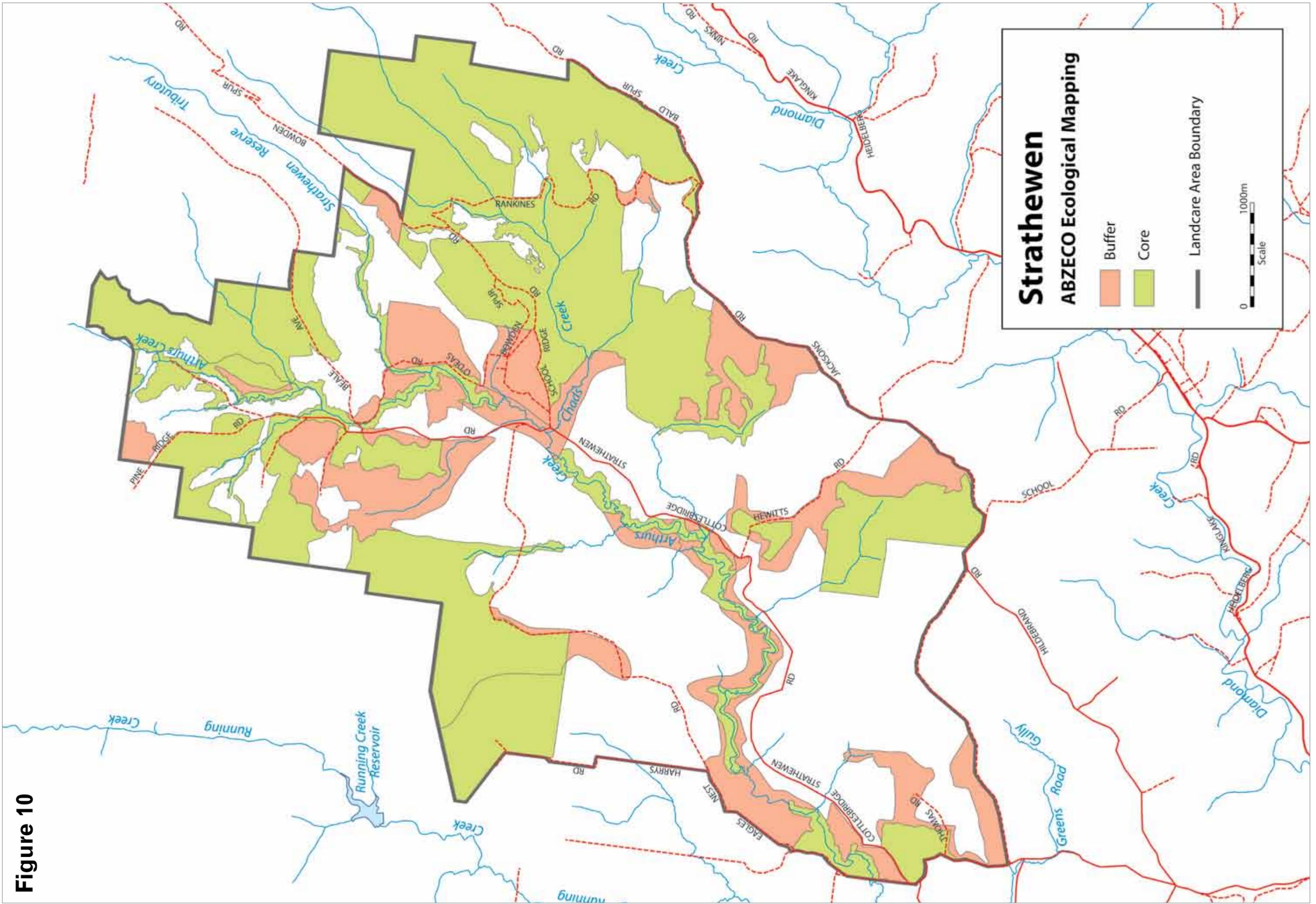
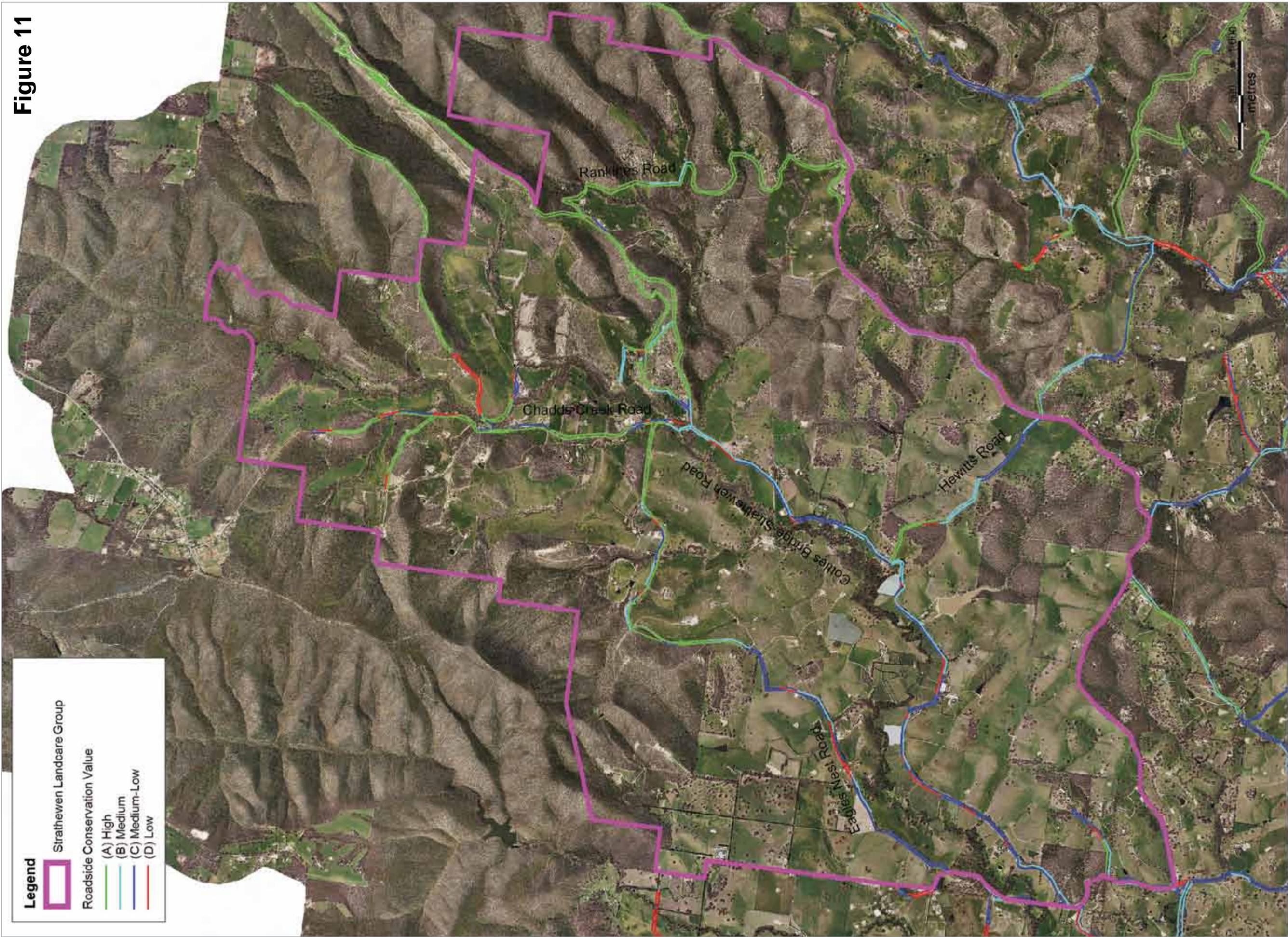


Figure 11



**Legend**

Strathewen Landcare Group

Roadside Conservation Value

- (A) High
- (B) Medium
- (C) Medium-Low
- (D) Low



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**Strathewen  
 Roadside Conservation Value**