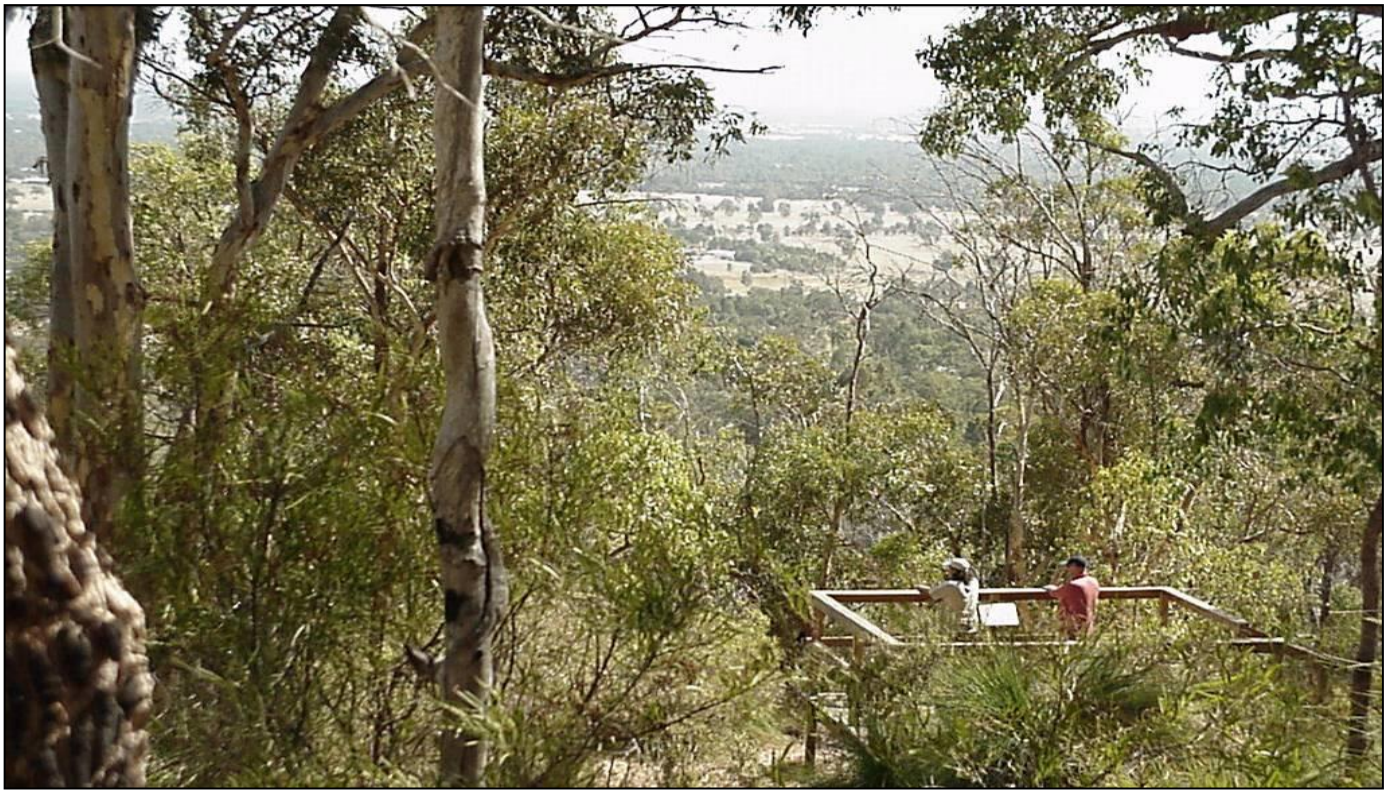
Serpentine-Jarrahdale Shire

Local Biodiversity Strategy



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Ironbark Environmental

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All photographs were provided by Andrew Del Marco unless otherwise indicated. Thanks to Karen Clarke for photos of vegetation complexes. Photos by Kiri Lochman used with permission.

serpentine jarrahdale shire

SOUTH WEST BIODIVERSITY PROJECT
Councils Caring for their Natural Communities

Australian Government

GOVERNMENT OF WESTERN AUSTRALIA

SOUTH WEST CATCHMENTS COUNCIL

Abbreviations

CCW	Conservation Category Wetlands
DRF	Declared Rare Flora
EPA	Environmental Protection Authority
LNA	Local Natural Area
MUC	Multiple Use Corridor
NASCA	Natural Area Special Control Area
PBP	Perth Biodiversity Project
SPF	Specially Protected Fauna
SWBP	South West Biodiversity Project
TEC	Threatened Ecological Community
LPS	Local Planning Scheme
VNA	Verified Natural Area
WALGA	WA Local Government Association
WAPC	WA Planning Commission

Reader's note and qualifications on native vegetation information

This is a consultant's report produced for the Serpentine-Jarrahdale Shire. All reasonable efforts have been made by Ironbark Environmental and the South West Biodiversity Project to ensure the accuracy of mapping and statistics included in this draft Strategy.

The native vegetation statistics used in this Draft Strategy are approximate only and have been produced by the South West Biodiversity Project for the purposes of developing the Shire's Local Biodiversity Strategy. Remnant native vegetation mapping was undertaken in 2007 by interpretation of 2005 aerial photography with adjustments for major clearing known to have occurred between 2005 and 2006. The mapping of vegetation complexes was undertaken at a regional scale and will need to be verified through site-specific assessments. Information supplied on threatened species and specially protected species is indicative only given the paucity of ecological survey in parts of the Shire.

Remnant native vegetation mapping has not included the assessment and verification of the vegetation's condition. As a result, statistics of remaining native vegetation in each vegetation complex are likely to be an over-estimate of the amount remaining of each complex. Vegetation condition assessment will show that some areas of mapped native vegetation are in very poor condition and may not be a priority for protection. Any decision relating to the retention, protection or management of a Local Natural Area should be supported by site-specific assessments using standardised formats.

Reference

This document is to be referenced as: *Del Marco A & Penna A (2007) Shire of Serpentine-Jarrahdale Local Biodiversity Strategy, Stage One: Draft Public draft Strategy, A consultant's report to the Shire, Perth.*

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President's Message

This draft Strategy is the Shire's major new initiative to protect bushland, forests and vegetated wetlands for future generations.

In a growing Shire like Serpentine-Jarrahdale, we need to be careful that our growth protects and manages remaining bushland, forest and wetlands (natural areas) so that we can all continue to enjoy the benefits into the future. The biodiversity that these areas contain can never be replaced once lost.

This report directly contributes to achieving two of Council's Strategic Plan and environmental objectives. These objectives are to:

- Protect and repair natural resources and processes throughout the Shire; and
- Strive for sustainable use and management of natural resources.

Under these objectives we have set a vision for our Local Biodiversity Strategy to:

Retain, protect and manage a connected network of over 5800 hectares of natural areas throughout the Shire so that these areas are found to be healthy and resilient in 2050.

Council is committed to conserving our biodiversity and is keen to hear your views on the proposals contained in this Draft Strategy. Where appropriate, the proposals in this Draft Strategy are likely to be implemented in coming years through our Local Planning Strategy and Local Planning Scheme. Some of the proposals would have implications for all our residents while others would affect those landowners with natural areas and considering development. In all cases, Council's aim is to work constructively with owners of bushland and wetlands, and where possible provide them with incentives to ensure the bushland is protected in the long-term.

Executive Summary

This draft Local Biodiversity Strategy (the Strategy) presents a number of proposals that will lead to greater protection and management of natural areas throughout the Shire. It has been developed over a 12-month process including a 3-month public comment period.

The draft Strategy focuses on 6333 ha of natural areas in the Shire. These are areas of bushland and vegetated wetlands and waterways on private lands and local reserves. 5986 hectares of these natural areas are on private lands, making the support of landowners critical to the implementation of the Strategy.

The Shire is within one of the world's 25 biodiversity hotspots, recognised because of the diversity of species, their uniqueness and the threats our bushland is under (Myers et al, 2000). These biodiversity values are especially important in the corridor between Byford and Keysbrook, which forms part of the eastern side of the Swan Coastal Plain.

Natural areas and biodiversity in the Shire have been significantly impacted since European settlement, especially on the coastal plain and foothills. On land west of South West Highway, only 4503 ha (or 11%) of the original 40,466 ha of native vegetation remains. This level of over-clearing, coupled with the impact of feral animals and other degrading processes, has resulted in significant local extinction of mammals and birds and the deterioration of bushland and wetlands. It has also contributed to the pollution of downstream rivers and the Peel-Harvey-Estuary.

It is critical that the Shire act now in order to prevent the further loss of natural areas and protect the variety of nature for the long-term. The Shire is going through a massive growth phase and it is estimated that by 2021 our population would have increased four-fold to 51,000 residents. This phenomenal growth poses a significant challenge to the conservation of biodiversity, but also provides a number of opportunities as land use changes from rural to more intensive uses.

To halt the further loss of natural areas and conserve biodiversity, the Shire proposes four goals in this draft Strategy to retain, protect and manage Local Natural Areas[1]:

Retention

Goal 1: Prevent the further loss of Local Natural Areas. This goal aims to retain at least 4000 hectares of Local Natural Areas in the Shire.

Protection[2]

Goal 2: Protect and manage a portion of each basic type of vegetation and ecosystem typical of the Shire. Approximately 1690 hectares of Local Natural Area would be protected to meet this goal.

Goal 3: Protect specific ecological features and processes including rare species, threatened ecological communities, wetland vegetation and ecological linkages throughout the Shire.

Management and restoration

Goal 4: Manage and restore Local Natural Areas and revegetate new areas to increase native fauna habitat.

[1] Local Natural Areas (LNAs) are natural areas that exist outside of Bush Forever Sites, the DEC-managed Estate and Regional Parks.

[2] Protection means a natural area is protected on public land vested for conservation, private land with a permanent conservation covenant; or fixed period management agreement. Protection may also include Special Control Areas covering natural areas. Goals 2 and 3 overlap, and most natural areas will meet both Goal 2 and Goal 3.

The targets under Goal 2 relate to protection of the different ecological communities in the Shire and have been developed by balancing growth and environmental protection goals. They would protect less than 2% of the Shire's original native vegetation when fully implemented over the long-term. This is made up of 675 hectares of natural areas on the Swan Coastal Plain and foothills and 1015 ha of natural areas in the Darling Scarp and Plateau. Table 1 shows how the targets could be met across current land zonings, considering the constraints posed by urban and rural land development.

Targets under Goal 3 will assist in prioritising areas to be protected to achieve Goals 2 and 3. Specific areas to protect are not identified in the Strategy as this will occur either as land is proposed for subdivision or major development, or as landowners wish to benefit from incentives offered by Council.

Table 1: Summary of the preferred scenario to meet protection targets

Zoning of land (Local Planning Scheme)	**Natural areas to be protected** (hectares of natural area)	
	Coastal Plain *(including Foothills)* ***Hectares***	**Darling Range** *(Scarp & Plateau)* ***Hectares***
Parks and Recreation *(Conservation, POS, Public & Community purposes)*	29 [of 29]	101 [of 101]
Rural A & B, Farmlet, Special Rural, Rural Groundwater Protection	56 [of 305]	0 [of 3]
Rural, Water Catchment	485 [of 1589]	890 [of 2097]
Urban / Residential / Special residential	29 [of 40]	9 [of 24]
Road & railway reserves, Drainage	58 [of 95]	0 [of 117]
Special Use	18 [of 20]	15 [of 102]
TOTAL	**675 [of 2078]**	**1015 [of 2444]**

Protection includes fixed-term management agreements, conservation covenants or conservation zoning. Subject to further public consultation, Council may also consider creating a special control area in its revised Local Planning Scheme to cover significant natural areas. This may offer some protection where other forms of protection are not possible.

Council understands that most landowners would not wish to protect natural areas in-perpetuity unless significant incentives are provided. Council is therefore raising the prospect of offering a number of incentives to landowners with natural areas on their properties. The incentives discussed in the Draft Strategy in Section 8 include:

1) Development-based incentives
2) A stewardship program (non-financial incentives);
3) Grants Program; and
4) Rate-relief linked to Conservation Zoning

Development based incentives may mean that the Council looks at the potential for subdivisions which protect bushland, either through offering lot bonuses in rural areas, or requiring cluster-style subdivisions in new rural living-type subdivisions. Development-based incentives are likely to require rezoning of land with natural areas to protect the natural areas and restrict further development. The support of the WA Planning Commission, which approves subdivision, would also be required.

A program that supports landowners with natural areas is considered a priority to ensure that the values of natural areas are conserved over the long-term. Landowners need support, including financial support to fence natural areas, control weeds, dieback and feral animals and manage for fire.

Landowners should be made aware that:

1) The protection of specific natural areas should occur:
    a. Where landowners voluntarily wish to protect the area via conservation covenant, zoning or fixed term management agreement; or
    b. Where the protection has been negotiated as part of a development proposal; or
    c. Where the site is protected as part of Public Open Space within urban subdivisions or required to be ceded free of cost to the Crown as part of a subdivision condition.
2) Generally, few sites will be protected through acquisition by Government given the lack of resources available for this purpose.
3) Landowners who are approached to protect areas as part of any Incentives Program have every right to refuse participation in the program.
4) The protection of any priority area would need to be negotiated with any landowner or developer in light of existing and proposed laws, policies and incentives, and the full range of planning and environmental considerations.
5) There are existing laws in place which create a presumption against native vegetation clearing in the Shire.

A number of other proposals are raised in the Draft Strategy, which although linked to incentives, could occur independently. The most significant of these proposals are the:

a) verification of natural areas which is required to confirm that existing mapped native vegetation is in relatively good condition and has an intact understorey;
b) establishment of a Special Control Area within the Shire's Local Planning Scheme, and
c) potential for an environmental levy.

The concept of a special control area is raised to provide a first level of protection to remaining natural areas and ensure a consistent approach to these areas is adopted through Council planning policy.

Funding of the Strategy will be from a combination of existing and new resources and external grants. The draft Strategy includes the option of raising a specific levy for the protection of natural areas. The levy would be in the order of $20-$30 per household and could be used on specific on-ground projects each year. This proposal, like most other proposals in the draft Strategy would require additional public comment before implementation.

Developers and landowners must appreciate that the protection of any specific natural area can only be required where it is covered by State or Federal law or a condition of subdivision or development. Where other significant natural areas are included in development proposals, their protection will be a matter for consideration on a case-by-case basis. Council has put forward these proposals with the aim of encouraging community comment on these proposals. We understand that it will be a significant challenge to protect the 6333 hectares of native vegetation covered by this Strategy amid the development proposed over the next 20 years. However, we believe that we have the community's support and the best interest of future residents at heart.

1. Introduction

In 2006, the Shire committed to preparing a Local Biodiversity Strategy to protect local areas of bushland, wetlands and vegetated waterways, especially where they have significant ecological features. Local Biodiversity Strategies are non-statutory documents which set long-term targets and short-term actions to protect significant natural areas across public and private lands. They are complementary to existing environmental and planning laws, but do not replace them.

This draft Strategy has been developed as the first part of our Strategy to encourage community debate on this important topic. This first stage of the strategy has been developed in accordance with guidelines produced by the WA Local Government Association (WALGA & PBP 2004). It is likely to be followed by the roll-out of four major components to implement the actions. These components are:

1) Conservation of biodiversity in the Shire's reserves;
2) Provision of incentives to landowners and developers to conserve biodiversity;
3) Incorporation of biodiversity conservation in assessment of development proposals;
4) Amendments to our Local Planning Scheme and Local Planning Strategy to support biodiversity conservation.

The Shire's Local Biodiversity Strategy needs the support of the community, landowners and development sectors to be effective. This is because most of the natural areas remaining in the Shire are located on private land. Providing incentives to landowners and developers to protect and manage natural areas is an underpinning principle of the first stage of the strategy and the subsequent implementation stage.

Figure 1: Jewel Beetle *(Photo by J. Lochman)*

Council is also aware that many in the community are concerned that existing environmental laws are often not being enforced and natural areas are being cleared and damaged as a result. Many of these laws are enforced by State Government according to state and regional priorities, and often do not address local concerns. Another factor has been the lack of resources to enforce local laws and planning conditions.

These concerns are shared by Council and have contributed to the preparation of this Draft Strategy. It is therefore Council's intent to implement some of the proposals in this draft Strategy to set local priorities and laws which could be enforced by Council through its Local Planning Scheme. The community's support for these initiatives would be essential before they could be implemented. The Council is also in the process of allocating new resources to enforcing its Local Planning Scheme and planning conditions.

1.1 Natural area statistics

This draft Strategy apply to 6333 ha of natural areas in the Shire or 7% of the Shire's original native vegetation. This 6333 ha is made up of:

- Local Natural Areas (LNAs) (4521 ha) (2073 ha on Swan Coastal Plain/Foothills and 2448 ha on Darling Plateau and Scarp)
- Bush Forever sites in private ownership (1531 ha) and
- Bush Forever sites under Council management (281 ha).

Local Natural Areas are the areas of native vegetation outside of the public conservation estate or Bush Forever sites (Tables 2 and 3) and are generally found on private land and local reserves.

Of the 6333 ha of LNAs and private Bush Forever sites, priority is placed on those on the Swan Coastal Plain, foothills and Darling Scarp, because so much of this native vegetation has been cleared. There is only 12.4% or 4503 ha of the original 36,338 ha of vegetation west of the Scarp remaining (Figure 2 and Table 2). In contrast, 91% of the native vegetation of the hills forest (Darling Plateau) remains.

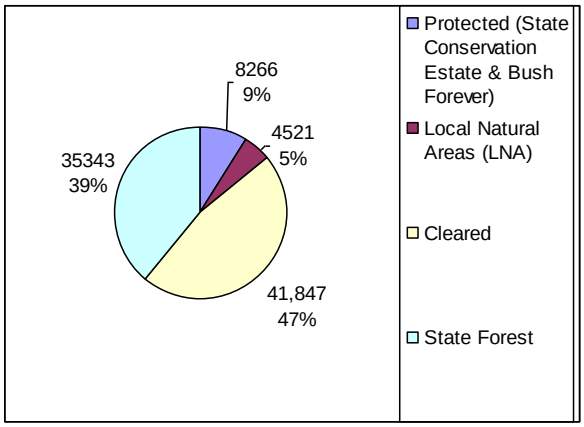
Table 2: Native vegetation of the Swan Coastal Plain & Foothills

Pre-European	40,466 ha
Total native vegetation protected:	2431 ha (6 % of pre-European native vegetation protected)
Total Local natural areas:	2073 ha
Total native vegetation retained:	4503 ha (11% of pre-European native vegetation retained)
Total cleared	35963 ha

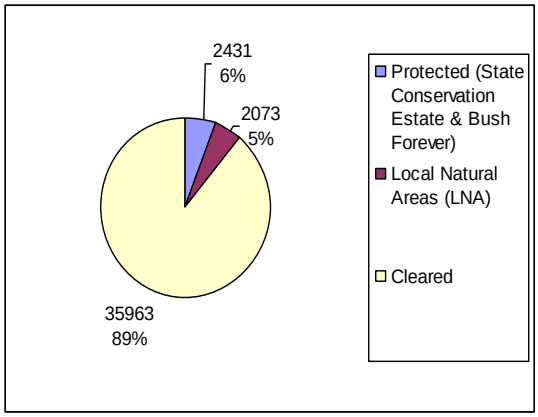
Overall, of the original 89,977 hectares of native vegetation in the Shire, 48,130 hectares or 54% remains. Of this only 8266 ha are protected in nature reserves, national parks or through Bush Forever (Table 3 and Figure 2).

Table 3: Native vegetation in Serpentine-Jarrahdale Shire

Pre-European	89,977ha
Total native vegetation protected *(Bush Forever, DEC estate, including Regional Parks, excluding State Forest)*	8,266 ha
State Forest	35,343 ha
Total not protected (excl. State Forest) *(These are referred to as Local Natural Areas)*	4,521 ha
Total native vegetation retained *(Includes protected, State Forest and non-protected)*	48,130 ha (54% of original vegetation remaining)
Total cleared	41,847 ha



Whole of Shire statistics



Swan Coastal Plain statistics only

Figure 2: Native Vegetation extent for the Shire of Serpentine-Jarrahdale

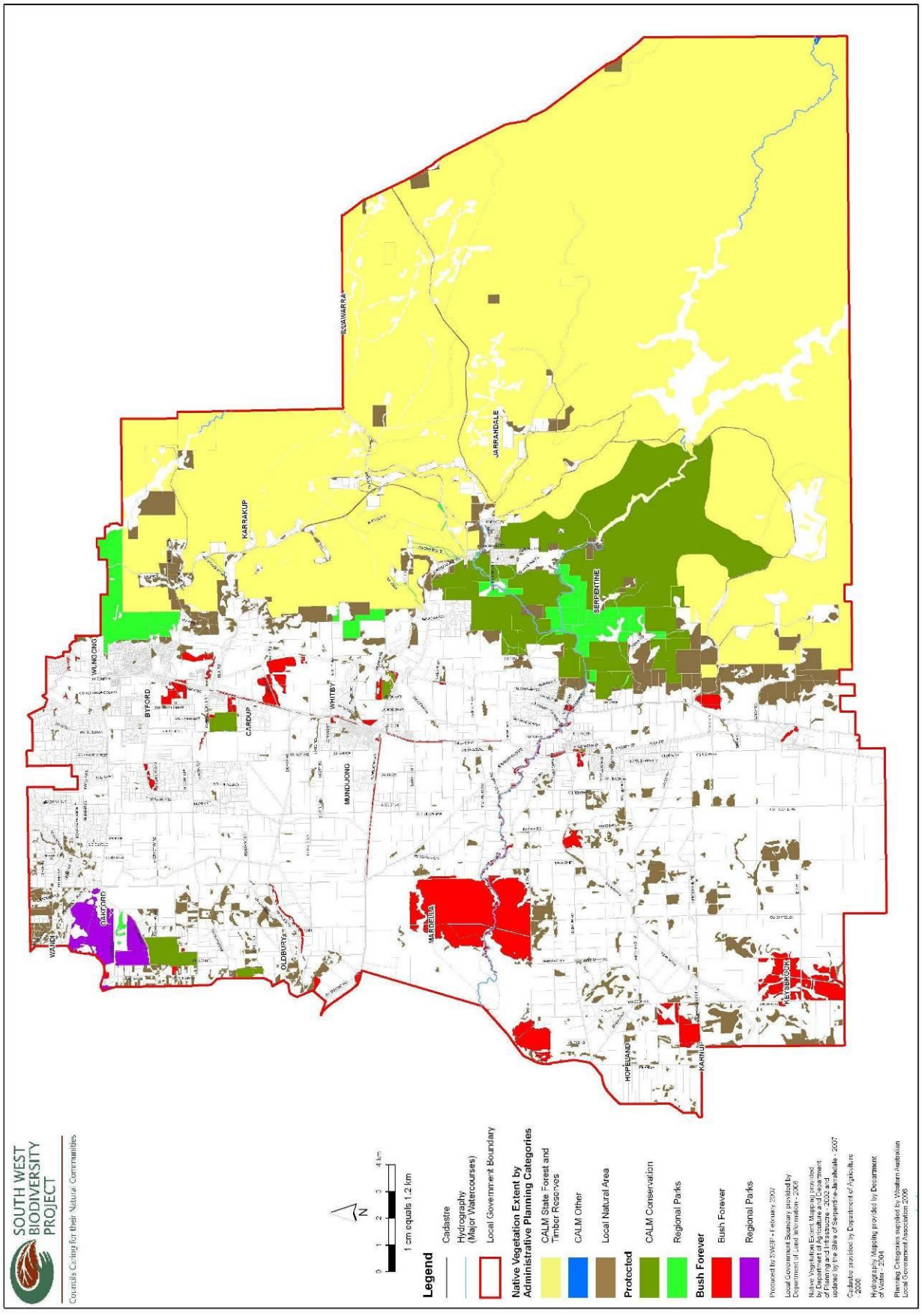


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Figure 3: Native vegetation extent in the Shire (2005)

1.2 Vision, objectives and goals

This draft Strategy forms a key part of achieving the Shire's vision for the future. Both our Strategic Plan and Aspirations 2020 have set objectives to:

- Protect and repair natural resources and processes throughout the Shire; and
- Strive for sustainable use and management of natural resources.

As a vision for biodiversity conservation, the Shire proposes in this draft Strategy to:

Retain, protect and manage a connected network of over 5800 hectares of natural areas throughout the Shire so that these areas are found to be healthy and resilient in 2050.

This vision would be achieved through the following four goals:

Retention

Goal 1: Prevent the further loss of Local Natural Areas. This goal aims to retain at least 4000 hectares of Local Natural Areas in the Shire.

Protection[3]

Goal 2: Protect and manage a portion of each basic type of vegetation and ecosystem typical of the Shire. Approximately 1690 hectares of Local Natural Area would be protected to meet this goal.

Goal 3: Protect specific ecological features and processes including rare species, threatened ecological communities, wetland vegetation and ecological linkages throughout the Shire.

Management and restoration

Goal 4: Manage and restore Local Natural Areas and revegetate new areas to increase native fauna habitat.

These goals are linked and will lead to a comprehensive network of protected and retained bushland, wetlands, waterways and revegetated areas. To achieve these goals, the Shire has proposed targets which will be used to identify which areas should be priorities for protection.

Figure 4: Marri-Kingia Threatened Ecological Community, Roman Road Nature Reserve

[3] Protection means a natural area is protected on public land vested for conservation, private land with a permanent conservation covenant; or fixed period management agreement. Protection may also include Special Control Areas covering natural areas. Goals 2 and 3 overlap, and most natural areas will meet both Goal 2 and Goal 3.

1.3 Biodiversity, natural areas and trees

The goal of producing a Local Biodiversity Strategy is to conserve biodiversity for current and future generations.

Biodiversity is often described as:

> *'The variety of life forms, the different plants, animals and micro-organisms, the genes they contain, and the ecosystems they form. It is usually considered at three levels: genetic diversity; species diversity; and ecosystem diversity'. (Commonwealth of Australia, 1996).*

Biodiversity exists in our bushlands, wetlands, rivers, rocky outcrops and other natural areas. It is generally accepted that if we conserve these natural areas and wisely manage surrounding land, then we will conserve a wide representation of our biodiversity

Figure 5: Fungi (Photo by A. Penna).

This draft Strategy focuses on the protection and management of natural areas as the foundation of protecting biodiversity. In this report the term 'natural areas' is used to describe an area that contains native species or communities in a relatively natural state and hence these areas comprise 'biodiversity' (WALGA & PBP, 2004). Examples of natural areas are bushland, wetlands, rivers and rocky outcrops. Local natural areas are the areas of native vegetation outside of the public conservation estate or Bush Forever sites (Tables 2 and 3) and are generally found on private land and local reserves. Parkland cleared areas or areas of revegetation are not considered natural areas in this draft Strategy.

This raises an important difference between natural areas, mature trees and revegetation. It is important that the community and developers recognise that it is one thing to conserve trees or revegetate areas using local species, and another matter to conserve biodiversity. Conservation of biodiversity is based on sufficient natural areas to be protected and managed, - including the presence of understorey species - , so that they are ecologically viable and resilient in the long-term.

Figure 6: Red-tailed Black Cockatoo.
Photo by J. Lochman,

To complement the protection of natural areas, Council will continue to encourage revegetation of waterways, retention of mature trees and other sustainable land development practices. The Shire already provides strong support for landcare and specific laws in its Local Planning Scheme which has

protect mature local native trees. What is required is a renewed effort to protect and manage bushland and other natural areas.

Figure 7: Trees (top) and natural areas (bottom)

2. A local biodiversity strategy

2.1 Why is local biodiversity conservation important?

Our community considers that protection of the environment is one of the two highest priorities for our future (Shire of Serpentine-Jarrahdale, 2006).

This community expectation is based in the many values of natural areas and the biodiversity they support. These benefits and values include:

- Natural areas protected over groundwater resources contribute to high water quality;
- Natural areas are set aside to provide significant passive recreation, research and educational opportunities for the local and regional community;
- New urban areas have a greater 'sense of place' and provide a 'green' living lifestyle for local residents when natural areas are protected;
- Existing natural area corridors are enhanced to allow for the presence of native flora and fauna within an increasingly urbanised environment;
- Local climates are moderated enhancing local air quality and supporting beneficial species that keep pest species under control;
- Important steps are taken towards reconciliation with local Indigenous people;
- Buffers are provided from roads, railway and industry and general improvement of aesthetics of an area; and
- Amenity, privacy and property values are maintained in our special rural areas; and

Conservation and protection of biodiversity is a priority at every scale. Our Strategy aims to deliver benefits at all scales, but especially at the local level.

2.2 Why a local biodiversity strategy?

This draft Strategy represents the first stage of our Local Biodiversity Strategy. Producing a Strategy is an important part of our business and good governance for the following reasons:

- Local Governments in the Perth Metropolitan Region have a responsibility to produce local bushland protection plans or biodiversity strategies under the State Government's Bush Forever policy (Government of Western Australia 2000, pg 30).

- Our Strategy aims to bring all of the major legislative and legal requirements into a single set of targets (See Section 5).The Shire and landowners often need to address numerous pieces of environmental legislation and policy and this can lead to confusion and time-delays;.

- A Strategy helps to achieve long-term goals. Setting targets for biodiversity protection and management means that we can monitor our conservation efforts as part of the growth of our Shire over the next 20 years.

- A strategy is needed to ensure that natural areas are protected and managed specifically for biodiversity conservation. It is recognised that retention of natural areas alone will lead to conservation of biodiversity.

- Development of a biodiversity strategy adheres to the principles of Ecologically Sustainable Development (ESD).

- The Shire should ensure a high level of management of natural areas within its reserves. This means going beyond meeting legislative requirements and providing an example to other landowners with natural areas.

Figure 8: Western green tree frog *(Litoria moorei)*
(Photo by J. Lochman)

2.3 Complementing Bush Forever

Council proposes targets and actions in this draft Strategy that complement those of Bush Forever. Bush Forever was a State Government initiative which identified natural areas to protect either through negotiation, complimentary development or purchase.

One of Bush Forever's targets was to protect a minimum of 10% of the major vegetation complexes in the Perth Metropolitan region. Most of the vegetation complexes found in the Shire west of South West Highway have been significantly cleared and not be protected to this level. As a result they are regionally significant.

The Council, in its support for Bush Forever, has proposed targets in this draft Strategy which will contribute towards achieving the 10% targets across the Perth Metropolitan Region for each of the original broad vegetation types. This is also supported by the Bush Forever policy which encouraged the identification and protection of locally significant bushland (Government of WA, 2000).

In the Shire, only 9% of the original natural areas will be protected under current policies and legislation including Bush Forever (8266 out of 89977 hectares). On the Swan Coastal Plain, only 6% of the original native vegetation is protected, whilst 12% of the vegetation of the Darling Scarp and Ranges is protected (South West Biodiversity Project, 2007). These statistics demonstrate the importance of protecting further natural areas on the Swan Coastal Plain and managing them for conservation.

2.4 Long-term protection

One of the significant proposals in this draft Strategy is that natural areas be protected where possible, rather than just retained.

'Protection' in the context of this draft Strategy means that a Local Natural Area is provided with some form of (formal) protection status either on:

- public land vested for conservation;
- private land with a permanent conservation covenant; or
- fixed period management agreement.

This does not necessarily mean that Council will be looking to have bushland publicly vested or purchased. In most cases it is preferable that natural areas remain in private ownership with management by empathetic landowners. In some cases, for example, where urban development is occurring, it may be more appropriate to have natural areas publicly vested and managed as part of the development.

Council also proposes to include the option of using fixed-period management agreements to encourage protection where landowners become part of a Stewardship Program and possibly receive financial incentives (See Section 8)

Subject to further public consultation, Council may also consider creating a special control area in its revised Local Planning Scheme to cover significant natural areas. This may offer some protection where the above forms of protection are not possible.

"Retention" in the context of this draft Strategy means that the natural area is in existence and is covered by the prevailing laws and policies of the land. Retained vegetation is not covered by a conservation covenant, public conservation reserve or management agreement.

It is important to note that all 'retained' and 'protected' natural areas also require appropriate management in the same way as any other community asset requires management. Funds will be required to maintain our natural areas and to support efforts by landowners to manage bushland and vegetated wetlands and waterways on their properties.

3. Threats to our Biodiversity

Biodiversity in our Shire is being lost and threatened in many ways. Poorly planned development, mismanagement by landowners and regional-scale threats are all leading to biodiversity loss. Council recognises all of these threats and has released this draft Strategy to draw attention to the need to protect our remaining natural areas.

Land use planning and development

Of all the major threats, this draft Strategy is designed to influence land use planning and development as the key means of protecting natural areas for the future. In many instances, past subdivisions and developments have not given adequate consideration to the long-term survival and health of remaining natural areas. Mining, extractive industries and rural developments also cause the direct clearing of natural areas and need to be carefully assessed.

Figure 9: Rubbish dumping in public bushland
(Photo by A. Penna)

Degradation through mismanagement

The draft Strategy also proposes an Incentives Program to support landowners manage natural areas on their properties (Section 8).
Many landowners actively or passively mismanage the native vegetation and natural areas on their properties. Active mismanagement includes allowing stock to graze understorey or ring-bark vegetation, too-frequent burning, and active clearing of vegetation. All of these actions can be considered clearing under the State Government Clearing Regulations (Environmental Protection Act, as amended, 1986). Passive mismanagement includes dieback introduction, and failure to undertake weed control.
Incidental clearing of native vegetation over a period of time is one of the greatest problems in many areas, but especially our special rural areas.

Regional and global scale threats

The Shire's natural areas are also impacted by regional and global scale threats such as climate change and changes in groundwater regimes. These threats are more difficult for the Shire to address, but are very important. Generally, these impacts reduce the ecological viability or resilience of remaining natural areas and their flora and fauna.

The Shire is working on programs such as the Cities for Climate Change Initiative to address energy usage and works closely with the State Government to address proposals for groundwater abstraction and water catchment management.

4. Existing legislation

A Local Biodiversity Strategy complements, but does not replace, existing laws and policies which cover natural areas. Some of the most significant laws relate to clearing of native vegetation and the protection of rare species and ecological communities. The most relevant pieces of legislation are the:

- Environmental Protection (Clearing of Native Vegetation) Regulations 2004;
- Environment Protection and Biodiversity Conservation Act;
- Wildlife Conservation Act; and
- Local Planning Scheme.

Under amendments to the Environmental Protection Act made in 2004, all clearing of native vegetation in the Shire requires a permit unless it is exempt. Applications for permits are assessed by the Department of Environment and Conservation using ten clearing principles, including consideration of how the proposed clearing impacts on local biodiversity targets. As clearing is also a form of development, it requires a Planning Approval from Council. Failure to obtain a Clearing Permit or Planning Approval where one is required is subject to fines under the Environmental Protection Act 1986 or Local Planning and Development Act respectively.

Most of the species and ecological communities known to be rare or under threat which occur in the Shire are given a level of protection under the Federal Environment Protection and Biodiversity Conservation Act (EPBC Act) or the State Government's Wildlife Conservation Act.

There are numerous other Government policies which cover the protection of biodiversity. [For a comprehensive list of laws and policies that relate to the conservation of biodiversity in the Perth Metropolitan Region, see (WALGA & PBP, 2004)].

Current Local Planning Scheme

When considering development proposals in the Shire, Council must interpret its Local Planning Scheme and abide by the various environmental and planning laws and policies. The Shire's Local Planning Scheme (TPS) sets in place rights and responsibilities concerning development whilst protecting the environment, landscape and amenity.

The Shire's Local Planning Scheme includes a Conservation Zone has been created, which allows landowners with significant natural areas to voluntarily rezone their lands to 'Conservation' and receive a reduction in rates. The scheme also contains a Tree Preservation Clause which requires landowners across the Shire to obtain permission before clearing trees. Both of these initiatives have been successful in raising the profile of protecting our natural environment. However, the Shire's Local Planning Scheme generally provides little guidance on the purpose and extent of protecting natural areas. In some circumstances, the TPS may not adequately restrict or control development.

Once endorsed by Council, the Shire intends to use this Strategy to work proactively with developers, landowners and the State Government to achieve the protection of natural areas. The Council also intends to introduce a number of incentives which could be made available to landowners with significant natural areas.

Despite the numerous laws currently protecting natural areas, they are still being cleared and grazed on numerous properties. Landowners are reminded that grazing of native vegetation requires a Clearing permit from the Department of Environment and Conservation unless it is exempt. Active clearing also constitutes development and offenders can be prosecuted under the Town Planning and Development Act 1928.

5. Biodiversity values to retain and protect

This Draft Strategy focuses on 6333 ha of the 48,130 ha of native vegetation remaining on local reserves and private property in the Shire. The other 41,797 ha of native vegetation in the Shire is managed by the State Government in state forest, national parks or nature reserves.

Council's aim is to retain all of this vegetation and ensure a large portion of the 6333 ha receives protection.

5.1 Retention of all natural areas (Goal 1)

Goal 1 of the draft Strategy is to retain all local natural areas remaining in the Shire. This goal reflects current State Government and Shire policy which generally prevents clearing from being approved.

The targets established under this goal (1A to 1C) are:

1	Retain an estimated 4000 hectares (of 4522 ha) of Local Natural Areas in the Shire, and only allow clearing in exceptional circumstances.[4]
	This includes retention of:
1A	• All Verified Natural Areas and parkland-treed areas that support a) Carnaby's Cockatoo, b) *Eucalyptus lane-poolei*, or c) *Eucalyptus laelei*. These are designated locally characteristic species under the Local Biodiversity Strategy.
1B	• All Verified Natural Areas and other native vegetation that occurs within Regional Ecological Linkages. These are to provide ecological stepping stones throughout the Shire.
1C	• All riparian vegetation in the Shire[5].

Retention means that the natural area is covered by the prevailing laws and policies of the land, but is not necessarily protected (See Section 2.4). Retained vegetation is not 'protected' by a conservation covenant, public conservation reserve, management agreement or special control area. The protection targets in the Strategy are separately described in Section 5.2.

Council may, in exceptional circumstances, consider allowing some clearing of natural areas where other natural areas are restored or cleared areas are revegetated (See Section 11.3).

[4] Exceptional circumstances are where clearing may occur where a natural area is:
- Severely degraded and outside of the eastern Swan Coastal Plain and not meeting any other targets;
- Approved for clearing under an existing development approval; or
- To allow single residences to be constructed on fully vegetated lots.

The exceptional circumstances should not lead to the clearing of more than 500 ha over the next 40 years.

[5] Riparian vegetation is associated with rivers, creeks and other waterways.

5.2 Protection targets (Goals 2 and 3)

To determine priorities for protection, Council has proposed further targets in Section 5.2.1 and 5.2.2 to achieve Goals 2 and 3 of the Strategy, respectively. The targets aim to protect both characteristic and rare elements of our original biodiversity. The focus of these targets is the retention and protection of priority natural areas, and not simply their retention. A separate retention target is described in Section 5.1.

The protection targets fall into one of two basic categories:

- Goal 2 targets: Protection of a minimum area of each of the vegetation types found in the Shire (**representational targets, See Section 5.2.1):** These targets are designed to protect a given percentage of each of the basic types of ecological communities found in the Shire, and
- Goal 3 targets: Protection of specific biodiversity features (**specific biodiversity feature targets, See Section 5.2.2**), such as rare and threatened species and protection of wetlands and waterways.

The Shire's proposed protection targets are based on recommendations by the WA Local Government Association and the State Government (WALGA & PBP 2004). Preference will generally be given to protection of vegetation in best condition. Where this is not possible, then Council may encourage or require restoration of degraded natural areas.

5.2.1. Protecting the variety of local bushland types

Goal 2 and Targets 2A to 2I of the Strategy aim to protect 1690 ha of the remaining native vegetation in the Shire. The targets aim to protect a portion of each of the different bushland types, or ecological communities found in the Shire. The Shire has used the mapping of vegetation complexes to identify basic bushland types or ecological communities at a very general level. Vegetation complexes are groups of vegetation which share similar underlying landforms, soils and climatic influences. These vegetation complexes are widely recognised as a sound method of defining ecological community biodiversity for local and regional biodiversity planning (Government of Western Australia, 2000).

The targets cover each of the seventeen vegetation complexes found in the Shire representing how much of that vegetation complex should be protected in the long-term. There are six vegetation complexes on the coastal plain, one on the foothills, one on the Darling Scarp and nine on the Darling Plateau. Vegetation within the complexes is not a uniform mix of species, but is rather a collection of different floristic assemblages, each of which can be separately mapped through vegetation surveys. The current distribution of these complexes is shown in Figure 10.

The targets have been developed with the assistance of a working group of Shire staff with the support of the South West Biodiversity Project. They take into consideration a number of factors including land zoning, current and proposed plans for development, land ownership and current levels of regional and local protection of each vegetation complex. The zoning of the land was one of the most significant considerations used to develop the proposed targets.

For each target, a breakdown is provided to demonstrate how the target could be achieved across current land zonings (See Table 5). These breakdowns represent the most realistic, cost-effective means of achieving the target. The community may wish to consider higher or lower targets which will require proportionally higher or lower levels of investment by the Shire and community. The fragmentation of natural areas in rural living areas and urban areas was also a major consideration. Generally, the more intensive the land use, the more difficult (and costly) it is to protect a viable natural area. The protection of any specific area to help contribute towards the target will be a matter of negotiation between landowners, developers, Council and in some instances the State Government.

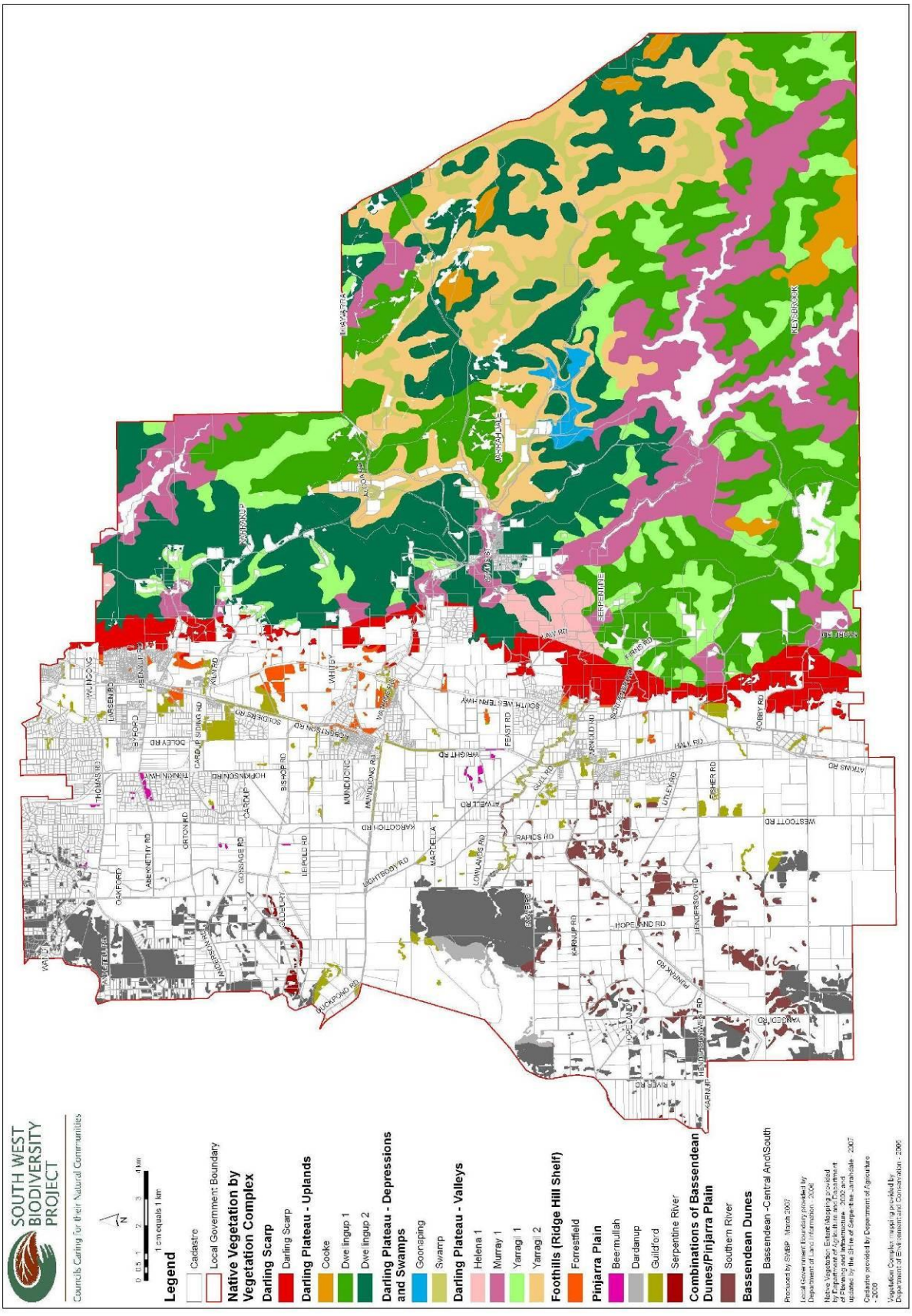

Figure 10: Current extent of vegetation complexes in the Serpentine Jarrahdale Shire

Table 4: Current retention and protection levels and proposed protection targets for Shire's vegetation complexes. Each representational target in the right-hand column indicates how much of each of the vegetation complexes in the Shire should be protected by the year 2027. A total of 1690 hectares of natural areas would be protected as a result of these representational targets. This corresponds to 1.7% of the original vegetation in the Shire (1690 of 89,977 hectares) or 34% of today's Local Natural Areas (1690 hectares of 4522 hectares).

Target	Vegetation complex	Original extent in Shire before clearing (ha)	Current extent in Shire 2006 ha (%)	Extent currently protected – (ha) and as (%) of original Shire extent	Representational Target (Shire's proposed protection target) (ha)
	SWAN COASTAL PLAIN				
2A	Bassendean Central and South Complex	9854	2707 (27%)	1666 (17%)	266
2B	Beermullah Complex	3691	40 (1%)	14 (< 1%)	20
2C	Dardanup Complex	1113	148 (13%)	135 (12%)	12
2D	Guildford Complex	13244	611 (5%)	347 (3%)	96
2E	Serpentine River Complex	783	51 (7%)	17 (2%)	8
2F	Southern River Complex	7653	680 (9%)	107 (1%)	172
	FOOTHILLS				
2G	Forrestfield	4128	266 (6%)	145 (4%)	101
	DARLING SCARP				
2H	Darling Scarp Complex	4175	2100 (50%)	812 (21%)	583
	DARLING PLATEAU				
2I	Cooke Complex	914	900 (99%)	0 (0%)	0
	Dwellingup 1 Complex	11030	10,536 (96%)	1420 (13%)	47
	Dwellingup 2 Complex	11398	10,676 (94%)	1226 (11%)	122
	Goonaping Complex	304	283 (93%)	0 (0%)	16
	Helena 1 Complex	599	592 (99%)	591 (99%)	1
	Murray 1 Complex	8530	6996 (82%)	1150 (13%)	133
	Swamp Complex	1797	1670 (93%)	0 (0%)	15
	Yarragil 1 Complex	4734	4224 (89%)	576 (12%)	66
	Yarragil 2 Complex	6030	5694 (94%)	0 (0%)	32
	Total	**89 977**			**1690**

Table 5: Preferred scenario to achieve the Shire's representational targets across land zonings *(Numbers in brackets are the amount of remaining LNAs, the other number is the area to be protected, e.g. it is aimed to protect 47 ha of the 153 ha of the Dwellingup 1 complex that occurs in the Rural Zone/ Water Catchment Zone).*

Land zoning category/ Vegetation Complex	Urban & Special Res. (ha)	Public Open Space (ha)	Special Use (ha)	Road, Rail & Drainage Reserves / Not Defined (ha)	Rural/ Hills Catchments (ha)	Special Rural/ Rural Living A & B / Farmlet (ha)	Total (ha)
Swan Coastal Plain and Foothills							
Bassendean		6 [6]	14 [14]	3 [23]	198 [740]	45 [257]	**266 [1041]**
Dardanup		1 [1]			12 [12]		**13**
Serpentine River					8 [34]		**8 [34]**
Southern River		1 [1]		5 [12]	165 [557]	0 [3]	**171 [573]**
Guildford	13 [24]	16 [16]	2 [2]	9 [17]	54 [182]	2 [30]	**96 [264]**
Beermullah				0 [2]	20 [20]	0 [3]	**20 [26]**
Forrestfield	16 [16]	5 [5]	2 [4]	41 [41]	28 [44]	9 [12]	**101 [122]**
Sub-Total	**29 [40]**	**29 [29]**	**18 [20]**	**58 [95]**	**485 [1589]**	**56 [305]**	**675 [2078]**
Darling Scarp and Plateau							
Darling Scarp	9 [9]		15 [22]	0 [47]	559 [933]	0 [2]	**583 [1015]**
Cooke	0	0	0	0	0	0	**0**
Dwellingup 1				0 [6]	47 [153]		**47 [159]**
Dwellingup 2	0 [11]	62 [62]	0 [60]	0 [21]	60 [245]	0 [1]	**122 [400]**
Goonaping					16 [53]		**16 [53]**
Helena 1					1 [1]		**1 [1]**
Murray 1	0 [1]	3 [3]	0 [21]	0 [22]	130 [397]		**133 [444]**
Swamp		9 [9]			6 [39]		**15 [48]**
Yarragil 1		2 [2]		0 [21]	64 [196]		**66 [217]**
Yarragil 2	0 [3]	25 [25]			7 [80]		**32 [108]**
Sub- total	**9 [24]**	**101 [101]**	**15 [102]**	**0 [117]**	**890 [2097]**	**0 [3]**	**1015 [2445]**

Coastal Plain and Foothills

Targets 2A to 2G cover the vegetation complexes of the coastal plain and foothills. The Shire proposes to retain all of the remaining coastal plain and foothills vegetation and protect 675 ha of this vegetation (Tables 4 and 5).

Only 6% of the original 40,466 ha of native vegetation on the Foothills and coastal plain is protected, with a further 5% retained but not protected. All of the six coastal plain vegetation complexes that occur in the Shire are considered as regionally significant because of the extensive clearing within the Shire and elsewhere on the coastal plain (Government of Western Australia 2000). Four of the six coastal plain complexes in the Shire are protected at less than 4% of their original extent (these are the Beermullah, Guildford, Serpentine River and Southern River Vegetation Complexes). The other two complexes, the Bassendean Central and South Complex and the Dardanup Complex are retained at slightly higher levels, but are still considered regionally significant.

Figure 11: An example of Bassendean Vegetation Complex (dampland)

A target of protecting an additional 266 ha of the remaining 1041 ha of LNA of this vegetation complex represents less than 3% of the original extent of the vegetation complex in the Shire.

Larger examples of this complex in the Perth Metropolitan Region should be protected as a priority (Karen Clarke, pers. comm.2007). Bassendean C/S complex largely occurs in the western parts of the shire, including Oakford, Oldbury, Hopelands and western Serpentine. (Photo by B. Keighery)

Figure 12: An example of Southern River Vegetation Complex – Forrestdale Lake

A target of protecting 172 ha of the remaining 573 ha of LNA of this vegetation complex is proposed. This represents 2% of the original local extent of the vegetation complex. (Photo by J. Cullity)

Figure 13 Serpentine River vegetation complex.

Eight (8) ha of the remaining 34 ha of LNA (or 1% of the original 783 ha extent). This is one of the few examples of this vegetation complex where the understorey is intact. Most of the rivers and creeks on the coastal plain no longer have a natural understorey. (Photo by B. Keighery).

Figure 14: An example of Guildford Vegetation Complex – Cardup Nature Reserve

A target of protecting 96 ha of the remaining 264 ha of LNA of this vegetation complex is proposed. This represents less than 1% of the original local extent of the vegetation complex (Photo by B. Keighery)

Figure 15: An example of Forrestfield Vegetation Complex – Brickwood Reserve

A target of protecting 101 ha of the remaining 122 ha of LNA of this vegetation complex is proposed. This represents 2% of the original extent of the vegetation complex. Forrestfield vegetation complex occurs on the foothills (of the Darling Range) on the eastern part of the Shire. (Photo by K. Clarke)

Darling Scarp and Darling Plateau

The Shire proposes to protect 1015 ha of the Local Natural Areas of the Darling Scarp and Plateau by the year 2050. This target could be achieved through protecting a portion of the Darling Scarp Complex and portion of each of the nine complexes in the Darling Plateau (Table 4). The targets would result in 57% of the existing Local Natural Areas in the Darling Scarp and 30% of each of the Darling Plateau Complexes being protected.

Figure 16: Darling Scarp vegetation complex.

Darling Scarp vegetation is particularly important in terms of its landscape values, especially for views from South West Highway looking eastwards.
(Photo by B. Keighery)

All protection would be achieved through negotiation with land owners either as part of an Incentives Program or through the development assessment process.

The vegetation of the Darling Scarp and Plateau has been less extensively cleared than the coastal plain however it is still being impacted through development of waterways, such as damming and clay extraction. The forest has also been impacted by decades of logging, mining of bauxite, jarrah dieback and horticultural developments. Less than 15% of the native vegetation of the Darling Ranges is protected in national parks and nature reserves.

Through setting a target for each of the nine vegetation complexes that occur in the Darling Plateau, the Shire aims to protect examples of the variety of vegetation found in the hills and protect 30% of the natural areas outside of state forest and national parks. Protection targets for each of the Darling Plateau complexes are included in Tables 4 and 5.

Figure 17: Jarrah Forest, an upland vegetation complex of the Darling Plateau, Jarrahdale

5.2.2 Protection of specific biodiversity values

Under Goal 3 of the Strategy, targets are proposed for six types of special biodiversity features found in some natural areas. These would be used to help prioritise natural areas that should be protected and managed, and not just retained. Where a natural area is in good or better condition and meets two or more targets, then it is likely to be a priority for protection. The protection of any specific area would be a matter for negotiation with a landowner, either as part of development proposal or other incentive.

The specific biodiversity features included in these targets are:

Target 3A: Declared Rare Flora, Specially Protected Fauna and Priority Species
Target 3B: Threatened Ecological Community (TEC)
Target 3C: Locally Characteristic Fauna and Flora:
Target 3D: Wetlands and wetland vegetation
Target 3E: Riparian vegetation on waterways
Target 3F: Ecological Linkages

Specific targets 3A to 3F are described in the following pages.

Target 3A: Declared Rare Flora, Specially Protected Fauna and Priority Species.
Protect all Verified Natural Areas which contain *Declared Rare Flora, Specially Protected Fauna and Priority One or Priority Two Species* or significant habitat for these species. [6]

A number of species within the Shire are rare and in danger of extinction. These are often listed as Declared Rare Flora (DRF) and Specially Protected Fauna (SPF) under the wildlife Conservation Act 1951. Appendix 17.3 lists the species of Specially Protected Fauna and Appendix 17.4 lists species of Declared and Priority Flora known to occur within the Shire. Priority Flora and Fauna are native species that are either under consideration as threatened species and need further survey to adequately determine their status, or are adequately known and require monitoring to ensure their security does not decline.

Figure 18: Southern brown bandicoot or Quenda (Photo by J. Lochman)

[6] Significant habitat or populations are those that, if lost, would change the formal conservation status of the species. For example, a species may change status from Priority One to become listed as Declared Rare Flora or Specially Protected Fauna.

Target 3B: Threatened Ecological Communities (TEC). Protect all Verified Natural Areas which contain Threatened Ecological Communities (TECs). (Verified Natural Areas are defined in Section 12.2)

Threatened Ecological Communities (TECs) are ecological communities of plants, animals & micro-organisms that are under particular threat and need of special protection. TECs are defined under a State Government process coordinated by the Department of Environment and Conservation and under the Federal Government's EPBC Act 1999.

Figure 19: Threatened Ecological Community, Roman Road Nature Reserve

Numerous occurrences of six threatened ecological communities are known to occur in the Shire, particularly on the eastern side of the coastal plain. A description of the TECs, and their legislative status, found within the Shire of Serpentine-Jarrahdale can be found in Appendix 17.2. Examples of these TEC's can be found in the Serpentine Sports Reserve, Brickwood Reserve and the South West Rail Reserve. The vulnerability of these sites illustrate how rare and threatened these ecological communities have become.

Target 3C: Locally Characteristic Fauna and Flora – Protect all habitats (natural areas and parkland-treed areas) of a) Carnaby's Cockatoo, b) *Eucalyptus lane-poolei*, or c) *Eucalyptus laelei* where such habitat occurs on properties proposed for development. These are designated locally characteristic species under the Local Biodiversity Strategy.

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ɔmmon or becoming uncommon and are
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nd cleared areas.

The Carnaby's Cockatoo (*Calyptorhynchus latirostris*) is a species of Specially Protected Fauna now reliant on parkland cleared areas for feeding habitat. The main threats to the long-term survival of the species are loss of nesting hollows and food resources due to land clearing. They are a partially migratory species that breed in the wheatbelt in winter to mid-spring and wander in flocks to coastal areas for foraging in the non-breeding season.

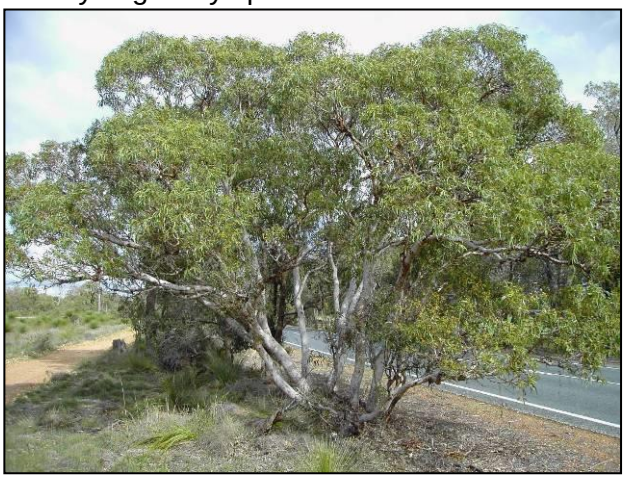


Figure 20: *Eucalyptus lane-poolei*, Soldiers Road, Cardup

Salmon White Gum (*Eucalyptus lane-poolei)* is uncommon in the metropolitan region, and is found in only a few places in the Foothills. The main occurrences of this species are around the Keysbrook, Mundijong and Byford areas (Powell, 1990).

Darling Range Ghost Gum (*Eucalyptus laelei*) is confined to the Darling Range between the Helena Valley and Harvey (a range of 135km), usually in the Darling Scarp. Locally, there are

occurrences in the Serpentine River National Park on hillsides above the Serpentine Falls and along Gobby Road in Keysbrook.

Target 3D: Wetlands and wetland vegetation. Protect all Verified Natural Areas which contain wetlands and wetland vegetation in good or better condition plus a buffer of upland vegetation. [7]

This target aims to protect natural areas which contain wetlands, their buffers and any associated vegetation that is required to maintain the wetland's ecology and diversity of species. Where development is proposed the Shire will encourage or require the rehabilitation and/or revegetation of a surrounding buffer where sites have been significantly cleared or degraded. Buffers to wetlands will be determined using a method proposed by the Department of Planning and Infrastructure (WA Planning Commission, 2005). As a guideline, wetlands which are considered as Conservation Category Wetlands (CCWs) should have a buffer of at least 50 metres of upland vegetation. Other vegetated wetlands should have an upland buffer of at least 30 metres.

Figure 21: Wetland, Lambkin Reserve. Serpentine

Target 3E: Waterways and riparian vegetation

Protect 10% of Verified Riparian Natural Areas within 5 years and 20% within 10 years.

This target has been set to reduce the impact of development on our waterways and their biodiversity. Waterways provide significant habitat for rare fauna such as the Freshwater snail (*Glacidorbis occidentalis*) - and Water-rat or Rakali (*Hydromys chrysogaster*) and are critical in maintaining water quality for private use and maintenance of ecosystems. Waterways also play a critical role in linking natural areas across the coastal plain.

Also note that Target 1C covers the retention of riparian areas and Targets 4E and 4F cover the restoration and management of riparian areas.

Figure 22: Freshwater mussels, Birrega Drain, Darling Downs

[7] Wetland buffers should be at least 50 metres for Conservation Category Wetlands and 30 metres for Resource Enhancement Wetlands.

Target 3F: Regional and Local Ecological Linkages

Protect 15% of natural areas on Regional Ecological Linkages within 5 years.

All other rivers and creeks in Shire are to be regarded as Local Ecological Linkages. Retention and protection of riparian vegetation is included in Targets 1C and 3E respectively.

Regional ecological linkages have been proposed across the Shire to encompass natural linkage features, including a number of major waterways. The Regional Ecological Linkages have been previously designated by the State Government in Bush Forever, Perth's Greenways and the System Six Study and supported by the WA Local Government Association (WALGA & PBP, 2004).

Clearing of native vegetation and development creates isolated natural areas surrounded by extensive areas of pasture, houses, roads and exotic plants. This is a significant problem on the coastal plain and foothills and makes it increasingly difficult for fauna to move across the coastal plain in either an east-west or north south direction. Isolation also makes it difficult for fauna and vegetation to cope with the multiple disturbances such as fire, weeds, rubbish dumping, feral animals and climate change.

The main aim is to protect existing natural areas that occur along the linkages and make them more resilient through management and revegetation of their buffers. The protection of natural areas as stepping stones for fauna and flora is a priority over the revegetation of continuous corridors for ecological as well as financial and resource reasons.

The proposed Regional Ecological Linkages are not to be confused with the Shire's Multiple Use Corridors and Trails. Plans for multi-use corridor systems (including trails) were not developed or based on ecological criteria and will only provide a very limited biodiversity benefit.

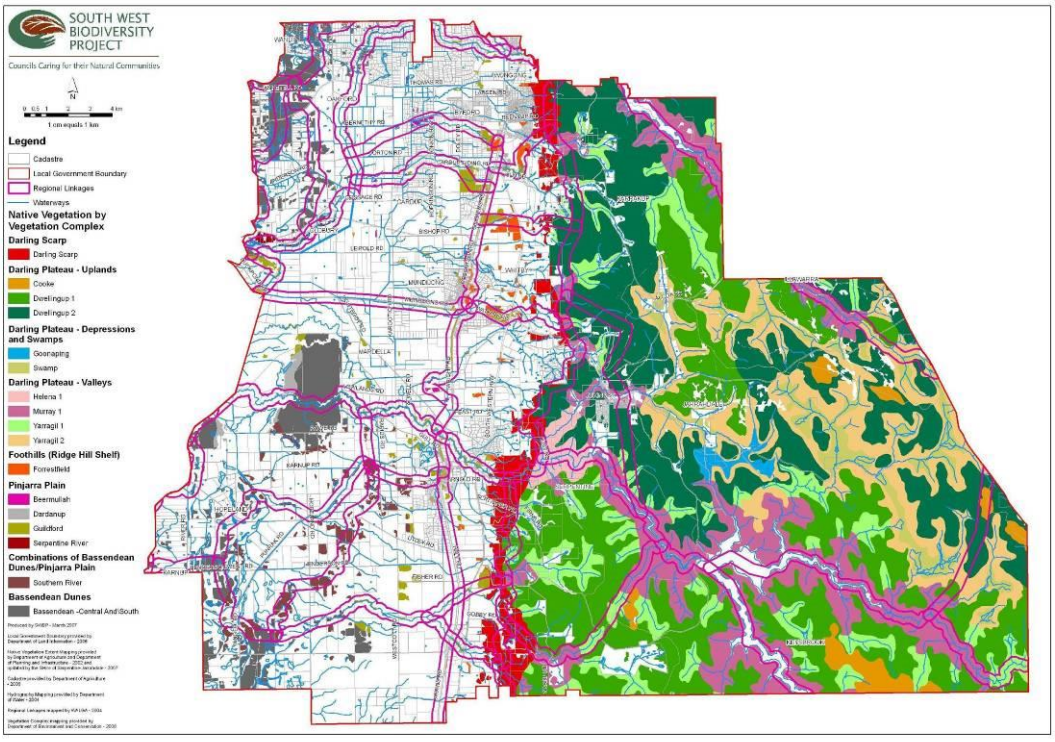


Figure 23: Regional Ecological Linkages (pink corridors)

6. Restoration and management (Goal 4)

Goal 4 of the draft Strategy is to 'Manage and restore Local Natural Areas and revegetate new areas to increase native fauna habitat'. This goal reflects the importance of management and restoration of natural areas, especially once they are protected. Restoration and management of natural areas is always a higher priority than revegetation of new areas.

Targets 4A to 4H in Table 6 are established under Goal 4 to cover natural areas in local reserves, private lands and new reserves created as a result of subdivision.

Table 6: Targets established under Goal 4

	Goal 4: Management and restoration[8] of Local Natural Areas	**Proposed implementation mechanism**
4A	Prepare a 5-year Management Strategy for all natural areas vested or owned by Council within 3 years.	Council Reserves Management Strategy
4B	All natural areas under Council vesting or ownership are actively managed for conservation in accordance with a 5-year Management Strategy within 8 years.	Council Reserves Management Strategy and operational plans
4C	All significant development proposals provide a Natural Area Management Plan to restore and manage biodiversity values on subject lands.	Local Planning Policy for biodiversity conservation, conditions of rezonings and structure plans
4D	Half of all LNAs are actively managed for conservation or form part of a stewardship program within 20 years (i.e. approximately 2260 ha of 4521 ha).	Stewardship program
4E	Restore 10% of Verified Riparian Natural Areas within 5 years and 20% within 10 years.	Stewardship program
4F	Fence 20 kilometres of coastal plain Verified Riparian Natural Areas, or 10 hectares of riparian vegetation, within 5 years, and restore and actively manage these areas.	Stewardship program
4G	Restore and actively manage 15% of natural areas on Regional Ecological Linkages within 5 years.	Stewardship program
4H	Where more than 500 metres exists between resilient natural areas on Regional Ecological Linkages, support ecological revegetation projects to create habitat stepping stones along Regional Ecological linkages.[9]	Local Planning Policy for biodiversity conservation and stewardship program

[8] All times quoted in the targets are numbers of years from the date of Council endorsement of the Local Biodiversity Strategy.
[9] For example, this occurs in the Byford townsite.

7. Selecting priority areas to protect

Goals 2 and 3 of the draft Strategy will lead to the protection of an additional 1690 ha of the 4523 ha of Local Natural Areas, including specific biodiversity features of LNAs in the Shire. While the targets under Goals 2 and 3 will help identify specific priority areas for protection, there will be numerous other considerations that would need to be taken into account before specific areas are prioritised for protection.

The major considerations are:

- Maximise the environmental benefit of each natural area protected;
- Clarify the standards of ecological assessment and who carries out the assessment;
- Work with landowners and developers to achieve the best possible outcome for all involved; and
- Ensure the protected natural areas will be managed in the long-term.

7.1 Maximum environmental benefit

To maximise the environmental benefit of natural areas to be protected, Council proposes to use the following guidelines to assist in the assessment and selection of specific areas to be protected:

1. All protected LNAs should contribute to a representational target (Target 2A – 2I) as well as a specific biodiversity feature target (Target 3 – Target 8);
2. Areas that meet a greater number of targets will generally be a higher priority for protection. For example, a natural area that contains a poorly protected vegetation complex and also forms part of a proposed ecological linkage should be considered a higher priority for protection than one of the same complex that does not form part of an ecological linkage; and
3. All protected LNAs are to have a relatively high ecological viability and have been assessed for their ecological viability and management needs (Section 6.2). Where possible, protected natural areas should have vegetation in good or better condition using the assessment methods of Keighery (1994) or Kaesehagen (1994).

7.2 Ecological assessment

Thorough, standardised ecological assessment should be an important part of any biodiversity Strategy. Assessment will be important in confirming the values of natural areas and determining their resilience or ecological viability. It usually involves suitably qualified botanists or ecologists to survey the natural area for species, bushland condition and evidence of fauna use and habitat. Unfortunately, little is currently known about most Local Natural Areas in the Shire.

It is proposed that in most cases, ecological assessment should occur using the standard methods provided in the Natural Area Initial Assessment (NAIA) templates developed by the West Australian Local Government Association (Clarke & Cullity, 2003). The NAIA templates can be applied to any natural area on the Swan Coastal Plain. They have already been used in numerous natural area reserves in the Perth Metropolitan Region. Use of the template on a 10 hectare natural area would require about 10-15 hours by a suitably qualified practitioner (WA Local Government Association & Perth Biodiversity Project, 2004).

As a general principle, landowners would be responsible for the cost of ecological assessment where it is related to a development proposal. In some cases, development proponents would also be required to carry out a more detailed botanical survey if the area had a reasonable chance of supporting significant species or ecological communities. Ecological assessment carried out as part of a Stewardship Program (Section 7.2) would be funded through the Program. All information collected using the NAIA templates should be maintained in a database to enable long-term monitoring and evaluation, including achievement towards the strategy's proposed targets.

Protecting viable areas

Each of the areas planned for protection in the Shire would need to be assessed for viability as part of an ecological assessment. A method to assess ecological viability is included in the Natural Area Initial Assessment (NAIA) Templates (Clarke & Cullity, 2003). This uses information on the natural area's size, shape, perimeter to area ratio, condition and connectivity to determine its relative viability (Cullity & Clarke 2005).

The concept of ecological viability is very important for effective and efficient biodiversity conservation and has been included in a number of the targets. Ecological viability is a measure of the ability of a natural area to be self-sustaining and support and maintain the full-range of species it naturally contains over a long time-frame, or at least 50 years (WALGA & PBP, 2004).

Ecological viability needs to be considered so that the Shire can assess the relative value of protecting each natural area in light of its long-term management needs. It must be recognised that no protected natural area within the Perth Metropolitan Region is self-sustaining without some level of active human management. Therefore, it is important to consider what level of management input will be required and how the design of the protected area (and the development around it) can minimise its long-term management needs.

Whilst viability should not be used as the primary determining factor to select areas to be protected, the Shire should consider the following factors when assessing future protected areas:

1. Size – There is no minimum size, however, larger reserves will generally require less management. Protected areas of four hectares in size will usually require a moderate level of management. There are many examples in the Shire of conservation reserves with good condition bushland which are smaller than 4 ha or with very high perimeter to area ratios [10];
2. Perimeter to area ratio - Compact in size and shape, with a low perimeter to area ratio;
3. Vegetation condition - Have at least 75% of their area in good or better condition; and
4. Connectivity – Sites within 500m of another protected natural area and located within a local or regional ecological linkage.

Protecting areas which may have a relatively low ecological viability will exist where:

- rare or threatened species or ecological communities must be protected;
- the vegetation complex is regionally rare and its prevailing condition is poor to fair; or
- the site is small or elongated and there are few other examples remaining of the vegetation complex.

Where the site is considered to have a low ecological viability, then works will be encouraged or required to increase its resilience and viability. This may involve the rehabilitation of the natural areas and/or revegetation of a surrounding buffer where sites have been significantly cleared or degraded.

[10] Size may often not be a critical factor, especially for the vegetation complexes of the eastern Swan Coastal Plain and Ridge Hill Shelf for which all areas of intact vegetation should be protected.

7.3 Working with landowners

The key consideration in the implementation of this draft Strategy is the support of landowners with bushland, wetlands or other natural areas. Most landowners appreciate the natural areas cannot be cleared and must be retained. However, most landowners will be keen to assess how the proposals to protect a portion of natural areas could impact on development potential.

7.3.1 Potential implications for landowners with natural areas

Implications for landowners with natural areas will vary depending on the location of their property in the Shire, the site's realistic development potential, the landowner's aspirations and the values of the specific natural area.

Landowners should be made aware that:

6) The protection of specific natural areas will occur:
    a. Where landowners voluntarily protect the area via conservation covenant, zoning or fixed term management agreement; or
    b. Where the protection has been negotiated as part of a development proposal; or
    c. Where the site is protected as part of Public Open Space within urban subdivisions or required to be ceded free of cost to the Crown as part of a subdivision condition.
7) Generally, few sites will be protected through acquisition by Government given the lack of resources available for this purpose.
8) Landowners who are approached to protect areas as part of any Incentives Program may refuse to participate in the program.
9) The protection of any priority area would need to be negotiated with any landowner or developer in light of existing and proposed laws, policies and incentives, and in light of the full range of planning and environmental considerations.
10) There are existing laws in place which create a presumption against native vegetation clearing in the Shire on land west of the Darling Scarp.

Where landowners with natural areas have or are considering development the following would also apply:

1) Where development is proposed over a natural area, proponents will be required to undertake expert ecological assessment (See Section 6.2);
2) All development proposals must be assessed in accordance with the Shire's Local Planning Scheme and Local Planning Strategy;
3) Council must implement approved development plans such as Structure Plans and approvals for subdivision. This has been a key consideration in the setting of the representational targets; and
4) Council must consider the potential for the natural area to be integrated into the surrounding land use or development.

The community, developers and landowners must appreciate that the achievement of the protection targets is largely a voluntary exercise. The protection of a specific Local Natural Area can be required under local, State or Federal law. Where natural areas are included in development proposals, their protection will be a matter for negotiation on a case-by-case basis. Landowners without development aspirations will be encouraged to protect their natural area through a range of mechanisms.

All landowners should appreciate that there will be a presumption against clearing of native vegetation in the Shire. This is based on Ministerial Conditions attached to the Peel-Harvey Environmental Review and Management Plan (1989) and the principles adopted under the Environmental Protection Act 1986 (as amended in 2004). Clearing of natural areas will generally

be opposed by Council, and where unavoidable, may require protection of alternative areas and revegetation post-development.

Landowners with natural areas may also be aware that the proposed Natural Area Special Control Area (NASCA) would cover all natural areas. This would be used to provide a legislative framework to implement some of the major proposals in this draft Strategy. Inclusion in the NASCA would mean that development proponents would need to demonstrate how the natural area is to be retained or protected and managed as part of the development. Landowners with natural areas in the NASCA may find that they are eligible for development bonuses or other incentives. Further discussion of the NASCA and its implications are included in Section 11.1.

7.3.2 Owners of large bushland areas

Working with landowners who have large natural areas on their properties or where the natural area covers the vast bulk of the property poses a significant challenge. These properties often provide significant environmental benefits to the wider community but make conventional forms of subdivision difficult. Council needs to carefully consider the future of these areas in light of their environmental value and realistic development potential. Key considerations for Council will be:

a) The current and future potential zoning of these properties;
b) the potential for subdivision on these properties to offer protection to the bushland area as well as realise a financial return to the landowner; and
c) the impact of rates and other taxes on these landowners.

This draft Strategy includes the concepts of subdivision for conservation in the rural landscape and cluster subdivisions (Section 7.1), both which will need significant investigation and development before they can be implemented in the Shire. These options may provide an opportunity to protect many of these larger privately-owned natural areas.

7.3.3 All landowners

All landowners in the Shire should also be aware of the proposals in this draft Strategy for a broad based funding mechanism, such as an environmental levy or rates allocation (See Section 14). This would seek to share the cost of natural area protection more widely across the community, and help fund some of the initiatives suggested in this draft Strategy.

Council believes that a broad based funding mechanism is appropriate given that all residents in the Shire benefit from protecting natural areas and should contribute to the cost. Currently owners of natural areas are expected to retain and protect these natural areas, often at the expense of development potential.

8. Potential incentives

Offering financial and non-financial incentives to landowners and those developing land is considered important to the success of any Local Biodiversity Strategy. Over 3600 hectares of natural areas are privately owned, mostly on land zoned Rural. To achieve the protection targets proposed in this strategy, 1375 ha of rural zoned natural areas would need to be protected over the long-term. This represents the majority (80%) of areas to be protected.

Incentives mean that landowners or land developers receive a financial or non-financial benefit in return for protecting natural areas on their property or development. Incentives are now used in numerous Local Governments throughout Australia. Providing incentives to landowners also gives recognition that the protection and management of the natural area is of benefit to the public, and not just the landowner.

All incentives would be voluntary and negotiated with interested landowners who meet eligibility criteria.

An incentives scheme developed by Council could have up to four types of incentives:

1) Development based incentives
2) A Stewardship Program (non-financial incentives);
3) Grants Program;
4) Rate-relief linked to Conservation Zoning

All landowners in the Natural Area Special Control Area would be eligible to benefit from the proposed scheme. Those receiving significant incentives (e.g. development based incentives) would be required to prepare a management plan as part of the agreement to protect the natural area.

8.1 Development-based incentives

Development-based incentives are an important incentive in a growing Shire such as Serpentine-Jarrahdale given the amount of development that is already proposed. These incentives may be applicable to all development types, but especially development and subdivision of large rural lots, and intensive subdivision for urban, special residential and rural living land use. The clear advantage of development-based incentives is that they are a low cost to Council, and can generate extra rates that can be used to provide ongoing incentives for new bushland blocks.

8.1.1 Subdivision within the rural landscape

Large parts of the Shire are likely to remain rural or lightly developed over the foreseeable future. In these areas, the creation of Conservation lots may be an incentive to protect natural areas. This would mean allowing an extra lot(s) to be created over and above that which would otherwise be allowed. Conservation lots in the Shire could be appealing as rural retreats in close proximity to the Perth and Mandurah CBDs.

The Shire's current Rural Strategy does not allow for subdivisions in the Rural Zone to create lots below 40 hectares, even where this may protect a natural area. Recently however, the State Government has changed its policy to allow lots less than this size for conservation purposes where this is supported by the Department of Environment and Conservation, National Trust of Australia (WA or other relevant agency (WAPC, 2008).

To enable subdivisions for conservation, the Shire will need to address this issue in its Local Planning Strategy and Local Planning Scheme which are to be reviewed over the next few years. The support of the WA Planning Commission and Department for Planning and Infrastructure will be important if such an initiative is to be progressed.

Figure 24: An unfenced Natural Area, Bassendean Central and South Vegetation Complex

The Shire could use a combination of its biodiversity targets and vegetation condition assessments to identify lots that are eligible lots in the Rural Zone for subdivisions for conservation.

Under the subdivision incentives, the priority should be to protect natural areas[11]:

- Of Beermullah, Forrestfield and Guildford Complexes, at least of fair condition, (Areas as small as 3 hectares of these vegetation complexes may be priorities. (total of 412 hectares of these three complexes);
- Of Bassendean Central and South Vegetation Complex – to protect areas of at least 10 hectares, where at least 5 hectares is in good or better condition (there are a total of 1041 ha of LNA of this vegetation complex); [12]
- Of Southern River Complex - to protect areas of at least 10 hectares, where at least 5 hectares is in good or better condition (there are a total of 573 ha of this vegetation complex);
- Of Darling Scarp vegetation Complex – to protect areas of at least 20 hectares, where at least 15 hectares is in good or better condition (there are a total of 1015 ha of LNA of this complex;
- Containing Threatened Ecological Communities, Declared Rare Flora, Specially Protected Fauna in Verified Natural Areas of at least 4 hectares, where 3 hectares is in good or better condition; or

[11] The above threshold areas are indicative only and will require further analysis before being applied in policy.
[12] 10 hectares has been chosen for Bassendean Central and South vegetation complex as it has been suggested that this would be supported under State Government planning policy.

- Containing Conservation Category wetlands (CCW) or Resource Enhancement Wetlands (REW) in a natural area of at least 5 hectares, where at least 3 hectares is wetland or native vegetation in good or better condition.

A requirement to restore and revegetate areas should be attached to the above subdivision incentives where the area has a low ecological viability.

Criteria have not been set for the Darling Plateau complexes as these are not regionally rare and subdivision opportunities are limited. Criteria have not been set for the Dardanup and Serpentine River Complexes on the coastal plan as there are only minor occurrences of LNAs.

Any subdivision proposal would need to conform to all other relevant provisions of the Shire's Local Planning Strategy and Local Planning Scheme. All natural areas protected under the scheme should be protected within a single lot and covered by a management plan. Natural areas should not be fragmented or cleared for fencelines, building envelopes or firebreaks. In some circumstances, the Shire may consider cluster-style developments to maintain the lot incentive and ensure that a large natural area is not fragmented onto separate lots.

Figure 25: Natural areas in Rural Living Zones. The subdivision of natural areas for rural living poses a number of management issues. Cluster-style subdivision may provide a solution in some cases.

Most properties likely to meet the above indicative criteria would be in the Rural Zone and given the size criteria, located in south west corner of the Shire south of Rowe Road and west of Westcott Road or in the Darling Scarp east of South West Highway.

It would be important that the above initiative be differentiated from the Environmental Repair Policy Overlay previously included in the Shire's Rural Strategy (Mortlock, 1994). The application of that policy required significant resources and the environmental repair was often poorly implemented and maintained.

8.1.2 More intensive subdivision & cluster-subdivisions

Cluster-style subdivision may offer an opportunity to protect large natural areas in areas that are planned for more intensive subdivision such as conventional Rural Living and Farmlet-type subdivisions. Cluster-subdivision is where the new lots are generally created in a confined part of

the parent lot so that a larger area can be retained in a single lot to protect specific values, such as bushland, sensitive landscapes or agricultural production values.

Cluster-style subdivisions are generally difficult to achieve within the current State Government policies, but examples are beginning to appear in a number of Local Governments areas, such as the City of Swan and the Shire of Augusta-Margaret River. The City of Swan has clauses in its Local Planning Scheme to allow consideration of strata cluster-style proposals (City of Swan Planning Scheme, 2007). A lot bonus is provided and restrictions are included to prevent re-subdivision of the strata lots.

The Shire's Rural Strategy limits subdivision of rural land to areas generally around townsites, and east of Kargotich Road. Any consideration of areas that may be suitable for future subdivision would be undertaken as part of the preparation of the Shire's Local Planning Strategy (LPS). Without prejudicing the outcomes of the LPS, opportunities for cluster-style subdivision to protect Verified Natural Areas and Conservation Category Wetlands should be investigated around the:

- South-west corner of the Shire, where there are numerous bushland areas as well as wetlands. This area will have direct access to the new Perth-Bunbury Freeway; and
- Oakford-Oldbury area, bounded by Thomas Road and the Birrega Main Drain. This area has numerous natural areas and wetlands.

The Shire would need to undertake considerable background work to assess the feasibility of this concept, and work closely with the Department of Planning and Infrastructure.

8.2 Stewardship program

Stewardship programs recognise landowners as the stewards and carers of the natural areas on their properties. A stewardship program builds a relationship with landowners of natural areas and provides them with advice on natural area management, assistance with grant applications and may also be linked to a grants program (See Section 7.3). The keys to a successful stewardship program are the ability to build the trust of landowners and continuity of service over the long-term. This would ensure that the stewardship support continues as properties change hands. A stewardship program would take at least 3 years to build a rapport with landowners.

There are a number of stewardship programs that are already operating in our region, including Land for Wildlife, Wetland Watch, and Healthy Wetlands Habitats. The service provided by the Landcare Centre to landowners with natural areas also constitutes an informal stewardship program.

A stewardship program in Serpentine-Jarrahdale could take one of a number of forms:

a) The Shire could contract an external program, such as Land for Wildlife or Wetland Watch, to provide a service specifically to Shire landholders;

b) The Shire could contract the Landcare Centre to provide a similar service; or

c) A combined service (external program combined with Landcare Centre input) could be negotiated.

The costs of delivering a stewardship program range widely depending on the range of services delivered. Each of the three options above may require Council to pay the relevant organisation to deliver the service, over and above existing funding.

Use of the Serpentine-Jarrahdale Community Landcare Centre to manage and deliver a stewardship program is a preferred model given that the Centre has already established links with

many landholders in the Shire, and a stewardship program would allow the Centre to attract greater skills and funding for natural area management. The Shire could negotiate this arrangement with the Landcare Centre, and see where opportunities for external funding would be attracted to support the program.

8.3 Grants program

Direct grants to landowners to undertake on-ground works have been shown to be an effective way of encouraging landowners to care for their natural areas (Bateson, 2001). There are many environmental grant programs that are available to landholders, but they differ in terms of their environmental focus and the conditions of funding.

Linking a grants program to a stewardship program or conservation zone is becoming increasingly common. This allows landholders to get expert management advice from someone whom they can get to know and easier access to grants to implement that advice.

Grants programs needn't be costly to the Council, and can attract external funding so that the Shire's funds are matched by additional Government money. Should the Council elect to offer grants as part of the implementation of its strategy, then it would need to focus funding specifically for management of Verified Natural Areas and linked to Strategy targets. This includes fencing of bushland, environmental weed control and dieback management. Streamlining and revegetation would generally not be eligible and are adequately funded through other programs. The program may need to consider that grant recipients enter into a 5 or 10 year management agreement to ensure that the site is managed for conservation over that period.

A local grants program may also assist landholders access other funding available through the Serpentine-Jarrahdale Landcare Centre, Federal Government Envirofunds, or State Government programs such as the South West Biodiversity Project, Lotteries West or the Community Conservation grants scheme.

A grants program may be a more attractive option over rate relief if the Shire has the resources to manage the program. Automatic rate relief can become an 'expected discount' for landowners and may not ensure that the natural area's values are being managed for conservation.

8.4 Rate relief

Local and State taxes are often a significant cost of retaining a natural area on private property in the Perth Metropolitan Region.

Another option for a financial incentive is therefore to expand the use of rate reductions for landowners with significant natural areas. Rate relief of 50% off the General Rural rate is already provided to three landowners in the Serpentine Jarrahdale Conservation Zone as a direct discount to rates. These properties have natural areas over 100 hectares in size which are of regional significance. A condition of rate relief has been that the property be rezoned to Conservation in the Town Planning Scheme. Rate relief is seen by these landowners as a sound incentive as long as it does not lead to increases in other rates or taxes on the same property.

Before an expanded rate relief system could be put in place, Council would need to undertake a financial assessment of the amount of funds that could be allocated to this incentive as part of funding the overall Incentive Scheme. The current rate relief scheme equates to a rate reduction of about $6 - $8 / hectare.

Council should also consider the relative merit of funding a grants program rather than an expanded rate relief program.

Should the Shire consider an expanded use of the rate relief incentive, then it may need to consider conditions to ensure that the incentive only applies to natural areas which meet specific criteria. The types of criteria could include:

1) The subject lot be:
    a. predominantly natural area, or a natural area over 20 hectares in size; and
    b. contributing to at least two of the targets in the Strategy.
2) The subject lot may need to be covered by both Conservation Zoning and a Conservation Covenant.
3) A management plan may need to be prepared and implemented.
4) A monitoring and evaluation system may need to be in place to ensure that the management plan is being implemented and landowners may be required to report on its implementation.

Figure 26: An example of Serpentine River Vegetation Complex – Lowlands *(Photo by B. Keighery)*

9. Urban development

The targets proposed in this draft Strategy would lead to the protection and retention of natural areas and native vegetation in the growing townsites of Byford, Mundijong and Serpentine.

The current growth of Byford and Mundijong poses numerous challenges for the protection and management of natural areas within and adjacent to the townsites. The main challenges are:

1) Securing protection of natural areas within the townsites;
2) Ensuring newly protected sites within the townsites are set up with appropriate infrastructure (e.g. fencing, weed control, etc) and buffered where necessary; and
3) Ensuring increased management of nearby reserves to offset increased public use.

The first challenge exists because there are few mechanisms that are commonly available to protect LNA's. Public Open Space provisions are not in themselves mechanisms to protect natural areas. Hence the Shire will need to find other mechanisms to protect urban natural areas,

A significant management issue in urban areas adjacent to natural areas is increased predation of fauna by cats, increased fire frequency and trampling and disturbance. The Shire is seeking to introduce restrictions to cat ownership around Brickwood Reserve and Bush Forever Site 354 in the future Mundijong Townsite. A challenge will be to ensure sufficient funding is available for these two regionally significant sites, as well as other sites such as Bella Cumming Reserve, Old Rifle Range Reserve and Manjedal Brook Reserve.

9.1 Landscaping and revegetation in Multiple-Use Corridors

Multiple Use Corridors (MUCs) are the corridors of land surrounding waterways in the Shire which are to be developed and used for stormwater management, recreation and wildlife habitat. Landscaping of Multiple Use Corridors with local species and revegetation of waterways can create habitat for a diversity of fauna and allow movement of fauna across the Shire. Many MUC's in Byford include stands of mature Marri trees which are important feeding habitat for a number of fauna (birds, bats, and insects) such as the Black Cockatoo. It is important that the community and developers realise that these re-created areas have a number of environmental benefits but do not replace the biodiversity of natural areas elsewhere in the Shire.

To ensure the best possible environmental outcome, guidelines are being put in place for the revegetation of Multiple Use Corridors to ensure that the areas of revegetation will be able to resist weed invasion, assist with nutrient management and provide habitat for the more hardy or mobile aquatic and aerial fauna.

Some MUCs in Byford and Mundijong have been identified as potential ecological linkages (See Figure 23). In some cases, revegetation to create green stepping stones for fauna along the MUC may be required to assist fauna movement. For example, an area of approximately 4 hectares should be revegetated on the Byford MUC between Brickwood Reserve and the Abernethy Road Bush Forever Site 365. This would assist birds and other mobile fauna negotiate the more hostile residential landscape when moving between the hills and the coastal plain.

10. Existing and future local reserves

Figure 27: Old Rifle Range Reserve, Byford

The Shire manages 281 hectares of native vegetation across 28 reserves. The involvement of the community and Landcare Centre in the management of over ten of these reserves provides a significant boost to Council and attracted over $200,000 in external funding in 2007/08. Two-hundred and fifteen hectares of this vegetation is regionally significant and included within Regional Parks or Bush Forever areas.

As part of the implementation of this draft Strategy, Council proposes the following actions:

(i) Conduct on-ground survey assessment of all 28 local reserves in the Shire with natural areas to identify biodiversity values and assess ecological viability. These assessments will be done using the standardised format of the Natural Area Initial Assessment (NAIA) template (WALGA & PBP, 2004). (Table 7, Action 19);

(ii) Develop a 5-year management strategy for Council reserves (Table 7, Action 20);

(iii) Include a conservation purpose in reserve vestings where appropriate to recognise the biodiversity values and to provide a higher level of protection for the long-term (Table , Action 27).

(iv) Prepare and implement reserve management plans. Depending upon the reserve, this may include:

a. Develop and implement management plans for highest priority reserves;

b. Develop rehabilitation plans for other reserves to identify key actions necessary to strengthen the ecological viability of the site, including:

- *Phytophthora* dieback assessment and implementation of relevant on-ground management actions (eg application of phosphite to susceptible species, implementation of a phytosanitary regime, etc);
- Weed mapping and weed control;
- Revegetation works for buffer protection or as part of an ecological linkage; and

c. Conduct bushland condition mapping in most reserves to obtain baseline information for natural area verification and long-term monitoring and evaluation of the shire's management activities.

11. Local Planning Scheme

The Shire's Local Planning Scheme and related documents regulate development and protection of the environment at the local level. They are fundamental to achieving the goals of biodiversity protection and the implementation of most of the ideas proposed in this draft Strategy.

This draft Strategy may therefore lead to a number of changes to these planning documents.

The Scheme is made up of a Local Planning Strategy and the Scheme text. Local planning policies, are related to the Scheme but are not formally part of the Scheme.

11.1. Local Planning Strategy and Scheme

A Local Planning Strategy:

- Sets out the long-term planning directions for the local government area;
- Applies State and regional planning policies; and
- Provides the rationale for the zones and other provisions of the local Planning scheme.

(Town Planning Amendment Regulations 1999)

Council is currently preparing a Local Planning Strategy to replace the Local Rural Strategy which has served the Shire well since 1993. The new Strategy will assist the review of the Local Planning Scheme planned to occur over the next few years.

To enable biodiversity conservation to be achieved as the Shire grows, it is likely that our Strategy may need to recognise the following concepts or proposals outlined in this draft Strategy:

1) The concepts and values of native vegetation, natural areas, Verified Natural Areas and biodiversity;
2) The suggested local biodiversity goals and targets;
3) The location of Verified Natural Areas;
4) The need to protect Verified Natural Areas, and in some cases, native vegetation or parkland cleared areas;
5) An assessment of the proposal to establish a Natural Areas Special Control Area (NASCA);
6) The concept of minimal loss of natural areas and an offsets policy;
7) Defined criteria and general locations where subdivisions for conservation or strata-cluster subdivisions may be considered;
8) Assess the need for a Local Planning Policy for biodiversity conservation; and
9) Review the possible expansion of the Conservation Zone.

By raising these concepts or proposals in our Local Planning Strategy, Council will be able to ensure that biodiversity conservation is being considered alongside other planning and sustainability issues.

Eventually, some changes may be required in the Shire's Local Planning Scheme. These could include:

i. Establishment of a Natural Area Special Control Area;
ii. New provisions related to subdivisions for conservation;
iii. New provisions related to strata-cluster subdivisions; and
iv. Review of provisions related to the Conservation Zone.

Public consultation on the establishment of a Natural Area Special Control Area in any new or amended Scheme will be required to ensure that landowners are fully aware of the purpose and operation of the Special Control Area. Checking the general condition of natural areas to ensure they are in relatively good condition will be an important part of the establishment of the special control area.

11.2. Policy for biodiversity conservation

Council may also establish a Local Planning Policy (LPP) for biodiversity conservation as part of its implementation of the proposals in this draft Strategy. A LPP for Biodiversity Conservation is required given the complex nature of biodiversity conservation and development assessment.

Local Planning Polices are not legally part of the scheme but need to be given due regard by Council when assessing applications for development. A LPP adopted by Council for the purposes of conserving biodiversity should clarify how:

a) development proponents are to consider on-site protection of natural areas;
b) developers of cleared land should contribute to the protection of biodiversity within the Shire; and
c) all developers aim to protect biodiversity or revegetate cleared areas.

11.3 Minimal loss of natural areas and offsets

Council also needs to give careful consideration to its goal of 'minimal loss of natural areas' as part of any Local Planning Policy. This goal effectively means that Council should oppose most clearing. Unfortunately, there will be cases where clearing is unavoidable to enable land to be effectively used for its zoned purpose. In these cases, Council may investigate the use of an offsets policy.

Offsets mean that an environmental impact of a proposed development is considered unavoidable, but worth allowing as long as measures are implemented to offset the impact elsewhere. In these situations, a proponent considering clearing is required to restore and protect a natural area elsewhere or undertake revegetation to create fauna habitat. Depending on the condition of the vegetation to be cleared, one hectare of natural area could be worth many hectares of revegetated land.

At the State Government level, an offsets position has been drafted by the Environmental Protection Authority and this could be used to guide the development of the policy (EPA, 2006).

12. Proposed protection system

One of the key proposals in this draft Strategy is the protection of priority natural areas throughout the Shire. The Shire appreciates that conservation rezoning or covenants may not be supported by most landowners and therefore propose a lower-level option of protection to cover natural areas.

The lower-level of protection would be via coverage of all natural areas with a Special Control Area where they are confirmed to be in good condition or otherwise worthy of protection (Section 11.1).

Higher level of protection will be via rezoning of the land to Conservation Zone, conservation covenant or a fixed-period management agreement. Areas protected under these higher levels of protection would contribute towards achieving biodiversity targets set out in this draft Strategy.

12.1 Proposed Natural Area Special Control Area (NASCA)

A Special Control Area is a zone in the Local Planning Scheme which can sit over any area covered by any other zone. It is sometimes described as an overlay zone.

Natural areas included in the proposed Natural Area Special Control Area would be confirmed to be in good condition or otherwise worthy of inclusion. The NASCA could also include Bush Forever areas, occurrences of rare vegetation types such as the Beermullah and Serpentine River Complexes, and habitat of locally significant flora or fauna.

A Special Control Area performs four functions:

- Identifies planning issues requiring special consideration;
- Controls buildings and works within the special control area in response to the planning issues;
- Sets out guidelines on the special considerations to be taken into account in considering development within the special control area; and
- Identifies relevant specialist agencies to be consulted prior to determining applications within the special control area. (WA Planning Commission 2000).

The NASCA is considered necessary to ensure all landowners, prospective purchasers of properties and authorities are aware that natural areas are valued in the Shire, and will require special consideration if they are proposed for clearing. It will also flag that a formal process, to be consistently applied, is in place to assess the impacts of proposed development on natural areas. Landowners with natural areas in the NASCA could also be eligible for incentives in return for protection and management of their natural area.

The Shire considers the NASCA to be important as the current Local Planning Scheme does not directly recognise natural areas or clarify how these values should be considered as part of the planning assessment process. Inclusion of a natural area in the NASCA does not necessarily mean that it would be protected should they be proposed for clearing as part of a development proposal. Nor can it necessarily prevent development over the natural area. This would be a matter for consideration on a case-by-case basis. However, landowners and developers must appreciate that approvals to clear for the most part already require application and assessment.

The NASCA should have strong links to a Local Planning Policy for Biodiversity Conservation (See Section 10.2) and the proposed Incentives Program (See Section 7).

Special Control Areas are already in place in the City of Armadale covering areas of bushland and wetland. These have been found to be useful in ensuring all landowners are treated fairly and equitably when development proposals are being considered.

12.2 Verifying natural areas

The draft Strategy proposes a program to check the condition of all of mapped native vegetation using aerial photography and limited field checking. The key requirement will be that areas of native vegetation must have their basic structure intact, including understorey for them to be classified as natural areas. All natural areas meeting this criterion would be described as Verified Natural Areas.

The program to verify natural areas would be carried out as part of the development of a Natural Area Special Control Area.

Council would undertake this verification using aerial photo interpretation (using 2005 aerial photos) and/or site visit to confirm that a basic vegetation structure is in place (i.e. some understorey remains). This verification process does not take the place of ecological assessment. It is a process designed to exclude areas of native vegetation that do not meet the minimum requirement of a verified natural area due to amount of degradation. Once areas have been confirmed as Verified Natural areas, a process could be put in place to check their general condition and status every five years.

Figure 28: Assessing a natural area to verify its condition

12.3 Conservation Zone

Since 1996, the Shire has had a Conservation Zone within its Local Planning Scheme which protects high conservation natural areas from inappropriate development in return for ongoing rate discounts to the landowners. Landowners re-zone their land to conservation voluntarily. Three landowners in the Zone in Mardella and Serpentine protect 1200 hectares of significant Verified Natural Area. Rate reductions over the zone cost Council $6,600, or $6/hectare/year.

It is proposed that the Conservation Zone be retained in the Local Planning Scheme and potentially expanded to protect the following additional areas:

- Bush Forever sites;
- Natural areas within 'Conservation orientated subdivisions';
- Natural areas protected as a result of application of the Local Planning Policy; and
- Other natural areas where landowners voluntarily enter rezone their property without a development bonus or subdivision.

Figure 29: Banksia menziesii

Rezoning to Conservation Zone would be voluntary, and triggered by either an eligible landowner wishing to take advantage of a development-based incentive or, in some cases, rate relief. Natural areas already in the Conservation Zone would be protected and managed in the zone. All landowners in the Conservation Zone would be eligible to be part of the Stewardship Program and the Grants program. Rate relief would only be offered to Conservation Zoned property owners based on the preparation and implementation of a management plan. The cost of rezoning land to Conservation could be borne by the Shire (where no development or subdivision is proposed), or by the landowner where the rezoning forms part of subdivision or development.

13. Suggested implementation framework

There are various ways in which our Local Biodiversity Strategy could be implemented. Figure 30 shows how some of these proposals could operate in relation to each other. The foundation of the Strategy would be the verification of natural areas and the creation of a 'Natural Area Special Control Area". Landowners with natural areas would be informed of the status of their native vegetation and be party to any verification of their natural area and the possible inclusion of it into a Natural Area Special Control Area.

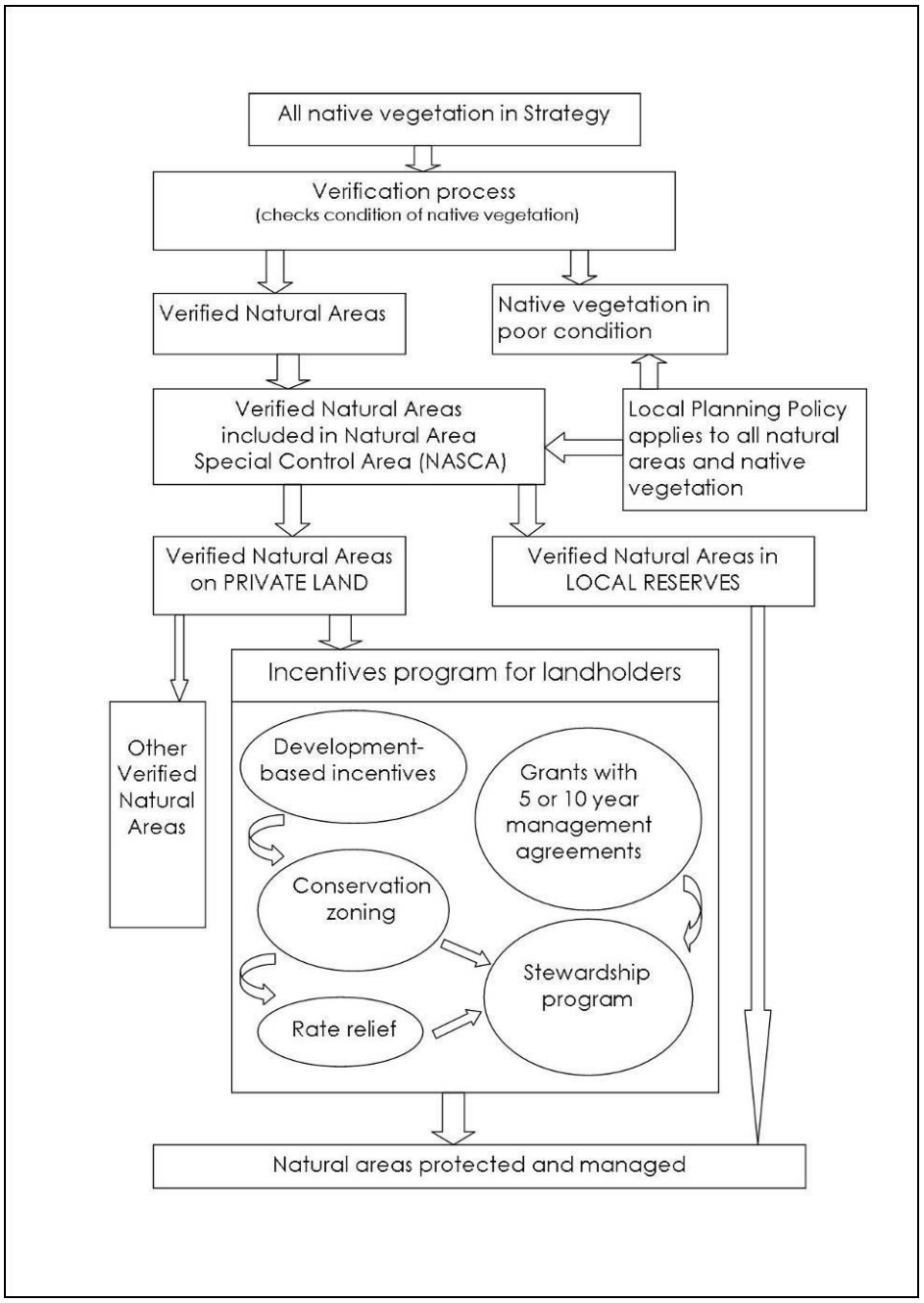


Figure 30: Proposed implementation framework

14. State Government endorsement

The support of the State Government is critical to the implementation of this draft Strategy's proposals. Key agencies involved include the Department for Planning and Infrastructure, Department of Environment and Conservation and the WA Planning Commission.

Following consideration of all public comments, the Council will work with the Department for Planning and Infrastructure to develop the biodiversity component of its Local Planning Strategy. The incorporation of the goals, targets and implementation mechanisms into our Strategy will be a priority.

The Shire will also be working with the Department of Environment and Conservation to ensure that the targets in this Strategy are reflected equitably through the process of assessing applications for clearing under the Environmental Protection Act 1986. The Department's support will be critical to achieving the targets proposed in this draft Strategy.

15. Costs and potential funding options

The Shire proposes to implement its Local Biodiversity Strategy through a combination of existing resources, new funds and external grants.

The most significant funding consideration is that many of the proposed actions can be achieved within current funding arrangements, but will require staff time and resources to be allocated to new initiatives.

In terms of new funding, it is estimated that an allocation of at least 0.5 FTE within the Shire's Strategic Planning and/or Environmental Teams would be required for each of the first five years of the Strategy. This will be to undertake work on:

- the Shire's Local Planning Strategy;
- establishment of a Natural Area Special Control Area;
- establishment of a Local Planning Policy and incentives strategy for conservation on private property,
- establishing a stewardship program and associated grants and/or rate rebates;
- trialling subdivisions for conservation; and
- coordinating overall implementation of the strategy.

In the first two years of the Strategy's implementation, the other new costs would be:

- verification of natural areas and creation of a Natural Area Special Control Area; and
- establishment of a stewardship program for landowners.

15.1 Local levies: Serpentine-Jarrahdale habitat fund

One option for funding parts of the Strategy is to raise an environmental levy specifically for the purpose of protection and management of natural areas. A levy would mean a flat rate would be charged to each rateable property in the Shire in the order of $20. Similar programs have been successfully established in a number of Local Governments around Australia, including the City of Mandurah and Shire of Hornsby in NSW. In the City of Mandurah a Sustainable City Reserve Fund has been established for a variety of purposes including the purchase of bushland.

The key to a successful levy program is to ensure that the funds are spent on specific, highly visible projects, such as the rehabilitation of a bushland reserve, restoration of a wetland or a grants program for owners of bushland.

The advantage of a levy imposed on all rateable properties is that the cost of protecting natural areas is shared across all landholders, reflecting the benefits that all in the community receive from protecting natural areas.

Council is aware that a levy or any form of rate increase may be of concern to many residents and further consultation would be required prior to implementing such a proposal.

However, to provide an indication of how the proposal could work:

1) A small levy could be imposed each year on all rateable properties. A $20 contribution per rateable property per annum could generate around $80,000 (based on 4000 rateable properties);
2) The funds would be spent each year on pre-approved specific projects, which would be developed in consultation with the community; and
3) The funds could only be used to protect or manage natural areas, according to a five-year works program.

Council could consider a general rate rise as an alternative to a flat levy, modified to ensure that the cost was shared broadly across landholders.

15.2 Other funding options

Other funding alternatives may be more difficult to establish or less reliable in the long term. These could include:

1) A revolving fund partnership could be set up for the purchase and on-selling of priority natural areas on rural private properties. This is something that can be addressed with non-government organisations such as the National Trust's Bush Bank Program. There is a growing market for lifestyle bush blocks and these are now marketed with the help of programs such as Bushbrokers.

2) Funds could be generated from developer contributions where natural areas are being unavoidably lost. Funds could also be generated from developments on land where significant clearing or land degradation has occurred. This option will be difficult to establish, but could be investigated as part of a local planning policy (Section 10.2), and/or

3) External grants may part fund the delivery of a Stewardship Program with associated grants to landholders.

16. Summary of actions

The goals of the draft Strategy set long-term aims for the Shire over the next 25 years. The actions summarised in Tables 7 and 8 cover implementation of the Strategy over the first ten years. Most actions are directly related to strategy goals and targets as indicated in the right-hand column. Other actions are related to either awareness-raising or monitoring the implementation of the Strategy (e.g. Actions 3 and 4).

Table 7: Summary of key actions (2008 – 2011) proposed to implement the Shire's Local Biodiversity Strategy

No.	Action	Related Goals/ Resourcing
	Actions 2008 - 2011	
	Strategy establishment and public awareness raising	
1	Consult the Department for Planning and Infrastructure, the Department of Environment and Conservation, and other relevant State Government agencies, on appropriate mechanisms for achieving local biodiversity targets.	Goals 1, 2 and 3 and all related targets Resources: Officer time; may require additional public consultation period.
2	Incorporate the goals, targets and actions of the Local Biodiversity Strategy into the Shire's Local Planning Strategy as it is developed.	Goals 1, 2 and 3 and all related targets Resources: Included as part of Local Planning Strategy development.
3	Prepare a simple guide to inform the community of the Local Biodiversity Strategy once it is finalised	Resources: Budget required for public awareness raising
4	Establish a system to manage information collected on Local Natural Areas. Ensure information is collected using the NAIA[13] templates and entered into an inventory.	Resources: To be achieved with the support of the WA Local Government Association and the South West Biodiversity Project.
	Retention and protection of natural areas	
5	Assess all native vegetation to identify those areas that meet the definition of natural area, and those areas that are better described as 'other native vegetation'	Goals 1, 2, 3 and all related targets. Resources: Aerial photo interpretation, with limited field verification
6	Investigate developing an amendment to the Scheme to introduce a special control area	Goals 1, 2 and 3 and all related targets.

[13] NAIA templates are the Natural Area Initial Assessment templates to be used by all Local Governments throughout the Perth Metropolitan Region.

No.	Action	Related Goals/ Resourcing
	over all significant natural areas, the proposed Natural Area Special Control Area.	Resources: Can be achieved through a combination of new and existing funds.
7	Make any necessary changes to the Scheme to allow for subdivisions for conservation and cluster-style subdivisions with the support of the WA Planning Commission.	Goals 2 and 3 and related targets. The WAPC will need to support changes to the scheme to allow the 40 ha minimum lot size to be changed for Conservation Zone lots.
	Incentives for protection and management	
8	As part of the Shire's Local Planning Strategy, progress opportunities for subdivisions for conservation in large rural lots and smaller rural lots. Develop criteria and opportunities for innovative subdivision in the rural zone to protect natural areas. This will include a desktop analysis of the size of natural areas on Rural Zoned Land, and field assessment for interested landowners.	Goals 2 and 3 and related targets. Resources: Initial external funding received for development of Local Planning Policy/ policy to cover conservation subdivisions. Consideration must be given to WAPC Development Control Policy 3.5 Rural Subdivisions.
9	Conduct formal review of the existing Conservation Zone initiative to enable its possible expansion to other natural areas of high significance.	Goals 2 and 3 and related targets. Resources: Can be achieved through re-allocation of existing resources.
10	Investigate options for delivery of a Stewardship Program, tailored to landholders in the Shire and the Strategy's targets. The program could be linked to a grants program.	Goal 4 and especially Target 4D The program should also include provision of on-site advice to all landowners with Local Natural Areas that meet biodiversity targets / criteria.
11	Subject to a resolution to establish a Stewardship Program above, develop partnerships to arrange delivery of the program.	Goal 4 and especially Target 4D Options include use of an existing program such as Land for Wildlife, or Wetland Watch, or development of agreement with SJ Community Landcare Centre. Extra funding will be required, and external funding may also be attracted.
12	For rural lots less than 40 hectares, the Shire should trial at least one strata cluster subdivision for conservation, possibly using a cluster-style subdivision approach.	Goals 2, 3 and related targets. Goal 4 and Target 4C. Resources: May be achieved through re-allocation of existing

No.	Action	Related Goals/ Resourcing
		resources.
13	For rural lots greater than 40 hectares, the Shire should trial at least one subdivision for conservation.	Goals 2 and 3 Resources: Can be achieved through re-allocation of existing resources.
	Policies and practices	
14	Investigate preparation of a Local Planning Policy (LPP)[14] for Biodiversity Conservation. The LPP should cover all development which has the potential to impact on the Strategy's targets[15].	All Goals. All targets under Goals 1, 2 and 3, and Target 4C under Goal 4 Resources: External funding has been obtained to prepare a draft LPP.
15	Trial the LPP in a number of development settings where a significant impact on natural areas may occur (*For example, urban structure planning, rural subdivision, and special rural subdivision*).	Goals 1, 2 and 3. Resources: Can be achieved through re-allocation of existing resources. External funding has also been received to commence this action.
16	Allocate resources to implement the LPP, particularly the verification of ecological assessments.	Goals 1, 2 and 3. Resources: Can be achieved through re-allocation of existing resources.
17	Raise developer's awareness of the LPP's requirements.	Resources: Preparation of an Info-note or similar as part of release of draft LPP.
18	Negotiate with urban developers of the future Mundijong/Whitby area to secure Local Biodiversity targets through the District Structure Plan, for example, by including statutory provisions for protection and buffering of natural areas.	Goals 2 and 3 Resources: Can be achieved as part of Mundijong District Structure planning process and other townsite structure planning processes.
	Protection and management of local reserves.	
19	Assess all reserves with natural areas (28 reserves) using the Natural Area Initial Assessment (NAIA) templates.	Goal 4, Target 4A Resources: Can be achieved through re-allocation of existing resources plus matched funding with SWBP and allocation of funds for specialist ecological

[14] A LPP is a non-statutory document which sits under the Local Planning Scheme
[15] The LPP should consider transferable development rights as part of LPP and negotiations with developers.

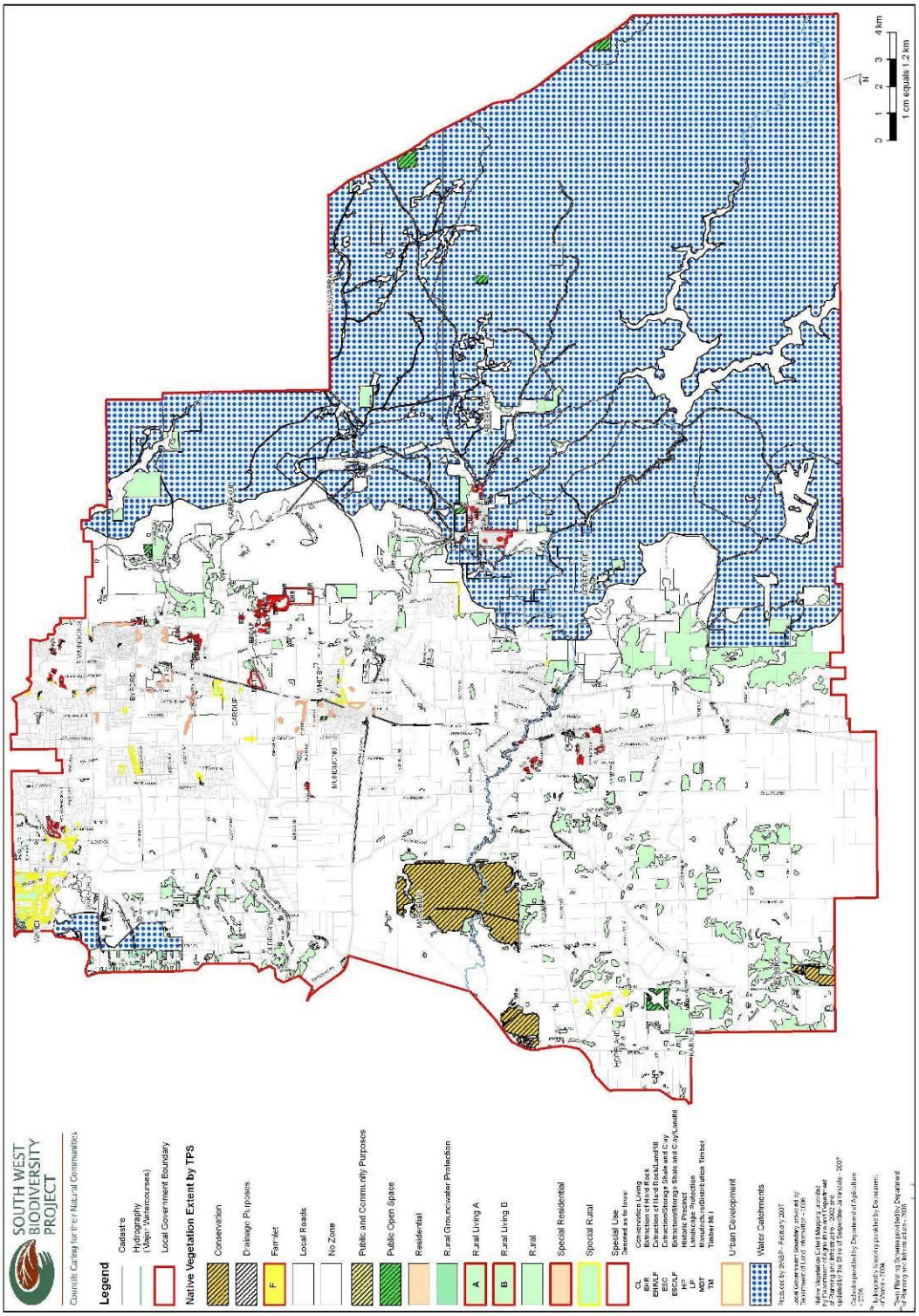
No.	Action	Related Goals/ Resourcing
		assessment.
20	Determine management priorities using information collected through NAIA templates, and develop a 5-year management strategy for Council reserves. In the interim, continue to use existing information and biodiversity targets to carry out priority management actions.	Goals 4, Target 4B Resources: Can be achieved through re-allocation of existing resources. (Note: This may require reclassification of the vested purpose for some reserves – e.g. from recreation to conservation)

Table 8: Summary of key actions for 2012 and beyond to implement the Shire's Local Biodiversity Strategy

	Medium Term Priorities (Year 2012 – 2015)
21	Review and update Local Natural Area mapping & statistics.
22	Review the Stewardship Program and Incentives schemes strategies in the concept of a 5 year rolling plan.
23	Report to the community on progress of the implementation of the Local Biodiversity Strategy. Use this as an opportunity to raise awareness of the Shire's high biodiversity.
24	Re-prioritise management of all reserves in the context of a 5-year rolling plan.
25	Prepare strategic local reserves financial plan for management and improvements to be undertaken in the context of a 5-year rolling plan.
26	Consider rationalisation of low value natural area reserves to generate funds or allow for trade offs for protection or management of other sites.
27	Carry out changes to vested purposes of reserves to incorporate 'conservation' where appropriate.
28	Identify unvested reserves or Special Purpose reserves with high biodiversity values. Seek State Government support for their re-classification to Class A reserves with a Conservation purpose

17. Appendices

Appendix 17.1 Native vegetation extent by Local Planning Scheme zoning


SOUTH WEST BIODIVERSITY PROJECT
Legend
Cadastre
Hydrography
Local Government Boundary
Native Vegetation Extent by TPS
Conservation
Drainage Purposes
Farmlet
Local Roads
No Zone
Public and Community Purposes
Public Open Space
Residential
Rural Groundwater Protection
Rural Living A
Rural Living B
Rural
Special Residential
Special Rural
Special Use
Urban Development
Water Catchments
0 1 2 3 4km
1 cm equals 1.2 km

Appendix 17.2 Threatened Ecological Communities (TECs)

The TECs of significance in the Shire include the following:

Community Identifier	Community Name	Conservation Category	
		WA	Federal
SCP3a	*Corymbia (syn. Eucalyptus) calophylla – Kingia australis* woodlands on heavy soils, Swan Coastal Plain	CR [B) ii)]	EN
SCP20b	*Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain	EN [B) i), EN B) ii)]	
SCP08	Herb rich shrublands in clay pans	VN [B)]	
SCP10a	Shrublands on dry clay flats	EN [B) ii)]	
SCP02	Southern wet shrublands, Swan Coastal Plain	EN [B) ii)]	
SCP3c	*Corymbia (syn. Eucalyptus) calophylla – Xanthorrhoea preissii* woodlands and shrublands, Swan Coastal Plain	CR [B) ii)]	EN
SCP15	Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain	VN [C)]	
SCP3b	*Corymbia (syn Eucalyptus) calophylla – Eucalyptus marginata* woodlands on sandy clay soils of the southern Swan Coastal Plain	VN [B)]	
SCP08	Herb rich shrublands in clay pans	VN [B)]	
SCP07	Herb rich saline shrublands in clay pans	VN [B)]	
SCP09	Dense shrublands on clay flats	VN [B)]	

Extracted from the PBP Guidelines 2003, confirmed with Department of Environment & Conservation, 2007

Western Australian Conservation Categories		Federal Government Conservation Categories	
Presumed Totally Destroyed (PD)	The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.	Critically Endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated	Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future	Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range		

Appendix 17.3 Threatened and Priority Fauna

#	Zoological Name	Common Name	Federal Conservation Listing
	WA Threat Listing: SCHEDULE 1		
1	*Dasyyurus geoffroii*	Chuditch	Vulnerable
2	*Myrmecobius fasciatus*	Numbat	Vulnerable
3	*Phascogale tapoata ssp.*	Brush-tailed Phascogale	-
4	*Pseudocheirus occidentalis*	Western Ringtail Possum	Vulnerable
5	*Setonix brachyurus*	Quokka	-
6	*Leipoa ocellata*	Malleefowl	Vulnerable
7	*Calyptorhynchus banksii naso*	Forest Red-tailed Black Cockatoo	-
8	*Calyptorhynchus baudinii*	Baudin's Black-Cockatoo	Vulnerable
9	*Calyptorhynchus latirostris*	Carnaby's Black-Cockatoo	Endangered
	WA Threat Listing: SCHEDULE 4		
10	*Falco peregrines*	Peregrine Falcon	-
11	*Morelia spilota imbricate*	Carpet Python	-
	WA Threat Listing: PRIORITY ONE		
	Arbinitis inornatus	Trapdoor Spider	-
	WA Threat Listing: PRIORITY TWO		
12	*Gladidorbis occidentalis*	Water snail	-
13	*Hydromys chrysogaster*	Water-rat	-
	WA Threat Listing: PRIORITY FOUR		
14	*Macropus irma*	Western Brush Wallaby	-
15	*Morelia spilota imbricate*	Carpet Python	-
	WA Threat Listing: PRIORITY FIVE		
16	*Isoodon obesulus fusciventer*	Quenda / Southern Brown Bandicoot	-

Western Australian Conservation Classifications		**Federal Government Conservation Classifications**	
Schedule 1	Fauna that is rare or is likely to become extinct	Extinct	No reasonable doubt that the last member of the species has died.
Schedule 2	Fauna that is presumed to be extinct	Extinct in the wild *****	Species exists only in cultivation
Schedule 3	Birds protected under an International Agreement	Critically endangered *****	Extremely high risk of extinction in the immediate future.
Schedule 4	Other specially protected fauna	Endangered *****	Very high risk of extinction in the near future
Priority 1		Vulnerable *****	High risk of extinction in the medium term
Priority 2		Conservation dependent	
Priority 3		*****	*Only these species are matters of national environmental significance (protected matters) under the EPBC Act 1999*
Priority 4			
Priority 5			

Appendix 17.4: Declared and Priority Flora for Shire of Serpentine Jarrahdale

(Note: this list is indicative only, and numerous species have been omitted.)

SPECIES NAME	WA CONSERVATION CLASSIFICATION	FEDERAL CONSERVATION CLASSIFICATION
Acacia horridula	3	-
Acacia lasiocarpa var. bracteolata long peduncle variant	1	-
Acacia oncinophylla subsp. oncinophylla	3	-
Andersonia saxatilis	1	-
Anthotium junciforme	4	-
Aponogeton hexatepalus	4	-
Baeckea sp. Perth Region	3	-
Caladenia huegelii	R	Endangered
Dillwynia dillwynioides	3	-
Diuris purdiei	R	Endangered
Drakaea elastica	R	Endangered
Drosera occidentalis subsp. occidentalis	4	-
Grevillea pimeleoides	4	-
Johnsonia pubescens subsp. cygnorum	2	-
Lasiopetalum pterocarpum	R	-
Millotia tenuifolia var. laevis	2	-
Paracaleana gracilicordata	1	-
Paracaleana granitica	1	-
Pimelea rara	4	-
Schoenus pennisetis	1	-
Stylidium longitubum	3	-
Synaphea odocoileops	1	-
Synaphea sp. Fairbridge Farm	R	-
Tetraria australiensis	R	Vulnerable
Trichocline sp. treeton	2	-
Verticordia lindleyi subsp. lindleyi	4	-
Verticordia plumosa var. pleiobotrya	R	Endangered #

(Source: Department of Environment and Conservation, 2007)

Western Australian Conservation Classifications		Federal Government Conservation Classifications	
Rare Flora		Extinct	No reasonable doubt that the last member of the species has died.
Schedule 1	Extant Taxa	Extinct in the wild *	Species exists only in cultivation
Schedule 2	Taxa presumed to be extinct	Critically endangered *	Extremely high risk of extinction in the immediate future.
Priority Flora		Endangered *	Very high risk of extinction in the near future
Priority 1	Poorly known flora	Vulnerable *	High risk of extinction in the medium term
Priority 2	Poorly known flora	Conservation dependent	
Priority 3	Poorly known flora	Notes:	
Priority 4	Rare flora	# Recovery Plan available * *Only these species are matters of national environmental significance (protected matters) under the EPBC Act 1999*	

Glossary

(extracted from WALGA & PBP, 2004)

Biodiversity is the variety of all life forms – the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part. Biodiversity is not static, but constantly changing; it is increased by genetic change and evolutionary processes and reduced by processes such as habitat degradation, population decline and extinction (Commonwealth of Australia 1996). Biodiversity has two key aspects:

- its intrinsic value at the genetic level, individual species level, and species assemblages levels
- its functional value at the ecosystem level.

Two species assemblages may have different intrinsic values but still have the same functional value in terms of the part they play in maintaining ecosystem processes.

Ecological community is a naturally occurring biological assemblage that occurs in a particular type of habitat (English & Blyth 1997; 1999). The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore, no particular scale is specified (Environmental Protection Authority 2003a). The criteria in this document are based on using vegetation complexes as a means of interpreting ecological communities (except for threatened ecological communities).

Under the Environment Protection and Biodiversity Conservation Act 1999, ecological communities are similarly defined as assemblage of native species that:

- inhabits a particular natural area
- meets the additional criteria specified in the regulations made for the purposes of this definition.

Ecological linkages are non-contiguous natural areas that connect larger natural areas by forming stepping stones that allow the movement over time of organisms between these larger areas.

Habitat is the natural environment of an organism or community, including all biotic (living) or abiotic (non-living) elements; a suitable place for an organism or community to live (Environmental Protection Authority 2003c). This term can be applied at a range of scales (Environmental Protection Authority 2003c). Vegetation can become a reasonable surrogate for outlining habitat when its main components, structure and associated landform are also described (Environmental Protection Authority 2003c). Habitat can be occupied by an organism or community continuously, periodically or occasionally or can have once been occupied and still have the potential for organisms of that kind to be reintroduced (Williams et al 2001).

Local Natural Areas (LNAs) are natural areas that exist outside of Bush Forever Sites (Swan Coastal Plain), the DEC Managed Estate and Regional Parks. In the past these areas have been referred to as Local Biodiversity Areas.

Locally Significant Natural Area is a Local Natural Area that meets a representational target and at least one specific biodiversity feature target.

Native vegetation – they are areas that have been mapped as 'native vegetation'. They include natural areas and areas of native vegetation that is degraded such that it cannot be defined as a natural area. The mapping of native vegetation used in this report was undertaken by the State Government using 2005 aerial photography. *NB: references to 'native vegetation' throughout this document are referring to 'naturally occurring' locally native species as opposed to revegetated areas of native species.*

Natural area is used to describe an area that contains native species or communities in a relatively natural state and hence contains biodiversity. Natural areas can be areas of native vegetation,

vegetated or open water bodies (lakes, swamps), or waterways (rivers, streams, creeks – often referred to as channel wetlands, estuaries), springs, rock outcrops, bare ground (generally sand or mud), caves, coastal dunes or cliffs (adapted from Environmental Protection Authority 2003a). Note that natural areas exclude parkland cleared areas, isolated trees in cleared settings, ovals and turfed areas. Not all areas of native vegetation are natural areas because of the level of degradation.

Natural Area Initial Desktop Assessment template is a template developed by the Perth Biodiversity Project to assist in assessing and recording baseline information for a natural area that has been obtained using desktop tools (that is, datasets and other reference tools).

Regionally significant bushland are natural areas that collectively aim to form a comprehensive, adequate and representative system of conservation areas (Environmental Protection Authority 2003a). In order for bushland areas to fall into this category, they need to be part of the existing or proposed conservation system or to meet, in part or whole, a range of criteria which are outlined in Appendix 3 of Environmental Protection Authority (2003a).

Vegetation condition is a rating given to vegetated natural areas (both uplands and wetlands) to categorise disturbance related to human activities. This rating refers to the degree of change in the structure, density and species present in native vegetation in relation to undisturbed 'pristine' native vegetation of the same type. (Adapted from Government of Western Australia 2000b).

Vegetation complexes (as defined by Heddle, Loneragan & Havel 1980; Mattiske & Havel 1998). Vegetation complexes are based on the pattern of vegetation at a regional scale as they reflect the underlying key determining factors of landforms, soils and climate. In the area covered by the System 6 region and Swan Coastal Plain portion of the System 1 region, there was a reliance on the underlying landform and soils as defined and mapped by Churchward and McArthur (1980) and a major review of the forest climates by Gentilli (1989).

Verified natural area is an area of native vegetation that has been assessed, either by field survey or detailed photo interpretation, to include a basic understorey vegetation component, and meet the criteria of natural area OR a wetland that has sufficient natural values to be assessed as a Conservation Category Wetland or Resource Enhancement Wetland.

Viability (as in ecological viability) is the likelihood of long-term survival of a particular ecosystem or species.

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