Local Biodiversity Planning Guidelines

For Local Governments in the South West of Western Australia

GOVERNMENT OF WESTERN AUSTRALIA

natural resource management program

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Disclaimer

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Introduction

Role of Local Government in biodiversity management

Local Government primarily interacts with biodiversity through their role as land managers, regulators, proponents and managers of infrastructure assets and facilitators of community engagement.

As a land manager and local governing body, Local Government plays a significant role in natural resource management. Local Governments are responsible for the management of bushland, wetlands and other important natural areas that contain biodiversity. In the South West of Western Australia, Local Governments can affect nearly one third of mapped native vegetation through land use planning decisions and reserve management (WALGA, 2016). In 2020, there was over 430,000 hectares of native vegetation mapped in over 8,000 reserves[1] vested in Local Government in Western Australia (WALGA, 2020). Many reserves, including those in urban centres, retain significant biodiversity and long-term viability depends on appropriate management.

Management of natural areas and delivery of Local Government infrastructure projects and services are subject to Australian and State Government environmental legislations. Section 3.1(1A) of the *Local Government Act 1995* also asserts the way a Local Government is to execute its functions:

> *The general function of a local government must be performed having regard to the following –*
>
> *a) the need –*
>
> *i) to promote the economic, social and environmental sustainability of the district; and*
>
> *ii) to plan for, and to plan for mitigating, risks associated with climate change; and*
>
> *iii) in making decisions, to consider potential long-term consequences and impacts on future generations*

Strategic and early consideration of biodiversity in decision making and project planning has been shown to be an effective way of minimising land use conflict, avoiding delays in regulatory approvals and minimising the cost of measures to mitigate or offset development impacts.

Why biodiversity matters

Natural resources, including remnant vegetation, wildlife and the landscapes they need to survive, underpin our quality of life, human health, wellbeing, the economy and social cohesion.

A global review of the economics of biodiversity showed that despite the known dependence of economies, livelihoods and human wellbeing on the natural environment, continued unsustainable engagement with natural resources is endangering the prosperity of current and future generations (Dasgupta, 2021).

To address this, adequate consideration of natural resources at all levels of decision making is critical, whether they are decisions on approving development activities or allocating budgets to manage threats to biodiversity.

In Australia, to reverse the ongoing decline in biodiversity, the 2021 State of the Environment Report recommends immediate action with innovative management and collaboration, and emphasises engagement across all sectors of society.

Adoption of best practices for all operational activities on lands containing biodiversity, whether delivered by Local Government staff or contractors, reduces the risk of natural area degradation by threats such as weeds or the introduction of diseases. Local Governments can also influence

[1] This figure does not include native vegetation within local road reserves.

public behaviour by managing access and use of significant natural areas and other Local Government managed lands, or by providing incentives for biodiversity conservation on private lands.

Community expectations for local environmental outcomes are reflected in Local Government Strategic Community Plans, which may include the sustainable use of natural resources and protection of the local environment as priority goals. These Plans are developed with significant community input, reflecting local community aspirations, and should be used to inform the Local Government's Corporate Business Plans as required by the *Local Government (Administration) Regulations 1996* and supported by the Integrated Planning and Reporting Framework.

Local biodiversity planning assists Local Governments with meeting the regulatory requirements and working with the community towards the expectations for the local environment. Local biodiversity strategies provide for strategic consideration of biodiversity, are an effective way of progressing the local environmental goals and facilitate community engagement. Biodiversity management instruments will depend on the capacity of individual Local Governments. Working in partnerships with community and other stakeholders can significantly increase the capacity of Local Government to consider and manage biodiversity.

Benefits of local biodiversity strategies

- Catalyst for early consideration of biodiversity in land use planning and support for decision making. It is recognised as valid consideration in land use planning as noted by the Western Australian Planning Commission, Environmental Protection Authority and the State Administrative Tribunal
- Provide for increased transparency on what 'significant' vegetation, often referred to in local planning scheme provisions, or 'significant' natural area means locally and where these 'significant' areas are located
- Local protection targets contribute to improved conservation status of biodiversity at regional levels
- Catalyst for prioritising investment in asset management
- Catalyst for identification of opportunities for restoration (local reserves, ecological linkages) to meet land management or environmental offset obligations or to support conservation initiatives
- Catalyst for mainstreaming biodiversity across Local Government operations and supporting compliance with regulatory requirements for Local Government infrastructure projects and operations.

Background on local biodiversity programs

These Guidelines build on the experience of local biodiversity programs supported by WALGA between 2002 and 2014, including the Perth Biodiversity Project, the South West Biodiversity Project and the Local Biodiversity Program.

The first Local Government Biodiversity Planning Guidelines were published in 2004 for the Perth Metropolitan Region (Del Marco *et al*, 2004). In 2007, an addendum to the guidelines was published to support Local Governments within the South West Biodiversity Project area.

Since the publication of the first Local Government Biodiversity Planning Guidelines, several aspects of the local biodiversity planning process have been refined, including ways to integrate biodiversity into local land use planning and the role of State Government in endorsing local biodiversity strategies.

The purpose of this document is to provide a guide on the development of local biodiversity strategies by Local Government. These Guidelines, based on principles of the local biodiversity planning process established in 2004, reflect the current regulatory framework and the lessons learned from a number of local biodiversity strategies.

Legislation and policies relating to biodiversity

In Western Australia, there are two key pieces of legislation to support biodiversity conservation: the *Environmental Protection Act 1986* and the *Biodiversity Conservation Act 2016*. In addition, the Australian Government has responsibilities for biodiversity conservation through the *Environment Protection and Biodiversity Conservation Act 1999*. Some Local Government activities might require approvals under Australian and State Government legislation.

The following section provides a brief overview of legislation and policies that inform the local biodiversity planning process.

Australian Government

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the central Australian Government legislation that provides a legal framework to protect and manage Matters of National Environmental Significance (MNES), including:

- World and National Heritage areas
- Wetlands of international importance (Ramsar wetlands)
- Nationally threatened flora, fauna and ecological communities
- Migratory species
- Commonwealth marine areas
- Nuclear activities, including mining.

An action that will have, or is likely to have, a significant impact on any MNES must be referred for assessment and approval.

The Australian Government uses a range of strategies and policies to manage the varied approaches to environmental management across Australia. Key Federal level policies and initiatives relevant to biodiversity management include:

- Nature Positive Plan (December 2022) prepared to address findings and recommendations of the Independent Review of the EPBC Act (Samuel, 2020) and the findings of the Australia 2021 State of the Environment Report.
- Australia's Strategy for Nature 2018-2030 provides the overarching national framework, with focus on adaptation, resilience and natural resource management in cities, rural and natural environments, and links with Australia's international commitments, such as the Aichi Targets and Sustainable Development Goals.
- Strategy for Australia's National Reserve System 2009-2030 is a national network of public, Indigenous and private protected areas, aiming to secure long-term protection for samples of all diverse ecosystems and the plants and animals they support. The National Reserve System covers 19.74% of the country. As part of its contributions to the international targets adopted under the Kunming-Montreal Global Biodiversity Framework,

the Australian Government has committed to protect 30% of Australia's lands and seas by 2030 (DCCEEW, 2022).

- Threatened Species Action Plan 2022-2032 sets out the Australian Government's pathway to recovery of our nation's threatened wildlife. 110 priority species have been prioritised in the Action Plan, including several Western Australian species such as the Western Ground Parrot, Western Ringtail Possum, Chuditch, Numbat, Quokka and Gilbert's Potoroo.

State Government

In Western Australia, there are 15 different pieces of legislation that affect native vegetation management in the State, each with different purposes and objectives. To address this, in 2022 the State Government adopted the Native Vegetation Policy for Western Australia (Government of Western Australia, 2022a). This policy seeks to:

- Enable all sectors to contribute to a net gain in native vegetation and landscape scale conservation and restoration
- Build business certainty through regulatory clarity, efficiency and coordination of decisions relating to native vegetation
- Provide a strong, accessible evidence base for policy decision making and transparency.

While the Native Vegetation Policy applies to State Government agencies, Local Governments are recognised as stakeholders to be engaged in delivering some of the priority actions outlined in the Native Vegetation Policy Implementation Roadmap (Government of Western Australia, 2022b).

Biodiversity Conservation Act 2016 (BC Act)

The BC Act and the *Biodiversity Conservation Regulations 2018* are the principal mechanisms for protection of the State's plants, animals and ecological communities. The Act provides for the listing of the threatened species and communities, registration of 'critical habitat[2]', listing of threatening processes, penalties for unauthorised taking of species and unauthorised modifications of threatened ecological communities and for failing to report threatened species or communities found in surveys. The Act introduced a new biodiversity conservation covenant which must be registered on the land title, providing for long-term protection of biodiversity conservation on private land.

Activities that affect species and ecological communities listed under the BC Act require a licence or Ministerial authorisation which are delegated to the Department of Biodiversity, Conservation and Attractions (DBCA). These requirements for authorisation under the BC Act recognise that activities approved under the provisions of the *Environmental Protection Act 1986* do not require further approval under the BC Act except for activities impacting threatened flora. Where the flora approved to be cleared under *Environmental Protection Act 1986* provisions is threatened flora, an authorisation to take threatened flora will also be required under section 40 of the BC Act.

Environmental Protection Act 1986 (EP Act)

The EP Act provides for the prevention of pollution and environmental harm and for the conservation, protection and management of the environment. There are various ways in which the EP Act protects biodiversity.

The Act provides for the establishment of the Environmental Protection Authority (EPA). The EPA is independent statutory body that advises the Minister for Environment on the environmental

[2] Habitat critical to the survival of a threatened species or ecological community can be listed and placed on public register. Critical habitat will normally be identified in recovery plans. The BC Act provides for habitat conservation notice under some circumstances, with a Notification on Land Title.

impact assessment of significant proposals (under section 38 of the Act) and assessment of land use planning schemes (under section 48 of the Act). The EPA also plays a role in shaping the State's environmental policy through the preparation and publication of environmental protection policies, guidance documents and advice.

Part V of the EP Act and the associated *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* provide for the protection of native vegetation. Under the Act, clearing of native vegetation is not permitted unless authorised or it is for an exempt purpose. Proposals to clear native vegetation are assessed against ten clearing principles, listed in Schedule 5 of the EP Act.

Conservation and Land Management Act 1984 **(CALM Act)**

The CALM Act provides for the use, protection and management of public lands and waters, flora and fauna. DBCA, on behalf of the Conservation and Parks Commission, manages the State's national parks, marine parks, conservation parks, state forest, timber reserves, nature reserves and other lands under the provisions of the CALM Act. Under the Act, land may be classified as a wilderness area, a limited (or prohibited) access area, a temporary control area or a recreational use area. Licenses and permits for actions undertaken on these lands are issued under this Act.

Under both the CALM Act and the BC Act, Aboriginal people can conduct customary activities on reserves and other department managed lands. The CALM Act also makes provision for lands to be jointly vested in the Conservation and Parks Commission and Aboriginal organisations.

Planning and Development Act 2005 **(PD Act)**

The PD Act is the principal legislation for land use planning in Western Australia. It sets out the procedures and requirements for strategic and statutory land use planning, prepares State Planning Policies and establishes the Western Australian Planning Commission (WAPC), its functions and powers.

Schedule 7 of the PD Act, 'Matters which may be dealt with by planning scheme', establishes biodiversity as a valid planning consideration, incorporating provisions for its preservation and conservation, including:

> *The conservation of the natural environment of the scheme area, including the protection of natural resources, the preservation of trees, vegetation and other flora and fauna, and the maintenance of ecological processes and genetic diversity.*

Land use planning has an important role in achieving biodiversity conservation outcomes through:

- Identifying and protecting natural areas with significant biodiversity values in conservation reserves and zones
- Directing development away from these areas via appropriate zoning and subdivision design
- Controlling the impacts of land uses on these areas, in accordance with permissible uses and development requirements in planning schemes.

Other legislation that supports biodiversity conservation

- *Country Areas Water Supply Act 1947* – clearing controls within designated catchments, including for clearing activities exempt under the EP Act
- *Rights in Water and Irrigation Act 1914* – regulating the taking of water from watercourses and wetlands within proclaimed areas
- *Swan and Canning Rivers Management Act 2006* – regulating activities to protect the Swan and Canning Rivers and associated lands to ensure maintenance of ecological and community benefits and amenity
- *Biosecurity and Agriculture Management Act 2007* – regulatory framework for Western Australia's plant and animal pests and disease biosecurity
- *Aboriginal Heritage Act 1972* – recognising, protecting and preserving Aboriginal cultural heritage, including natural areas that may constitute an Aboriginal place or cultural landscape.

Planning strategies and policies

In Western Australia, three key planning documents give land use planning its strategic direction in relation to protecting the environment:

1. State Planning Strategy 2050 (Government of Western Australia, 2014) provides strategic context and a guide for future strategies, plans, policies and decisions by public and local authorities with specific responsibilities or influence in the sustainable use and development of land throughout the State. Environment is one of the six principles underpinning the Strategy, with a strategic direction set to:

   Conserve biodiversity, achieve resilient ecosystems, protect significant landscapes and manage the State's natural resources in a sustainable manner.

2. State Planning Policy No. 1: State Planning Framework (Government of Western Australia, 2017) is an overarching policy that expands upon the key principles of the State Planning Strategy 2050 in planning for sustainable land use and development.
3. State Planning Policy No. 2: Environment and Natural Resources Policy (SPP 2) (Government of Western Australia, 2003) acknowledges that biodiversity conservation is a significant issue for land use planning in Western Australia. The policy objectives are to:
   - Integrate environment and natural resource management with broader land use planning and decision making
   - Protect, conserve and enhance the natural environment
   - Promote and assist in the wise and sustainable use and management of natural resources.

Section 5.1 of SPP 2 provides for the identification and protection of significant natural areas in planning strategies, schemes and decision making.

In addition, SPP 2 provides specific measures for water resources and biodiversity, including mechanisms to protect and manage areas identified as being of high conservation significance at the State, regional and local level. The policy notes that planning strategies, schemes and decision making should seek to avoid land use and development impacts on high conservation value areas, assist with the establishment of a comprehensive, adequate and representative (CAR) reserve network, establish ecological linkages, protect high conservation value areas through planning and development control and support the use of management plans for these high value areas.

Guidance on identifying high conservation value areas

Guidance on how to identify areas of high conservation values has been provided through the State Government initiatives such as Bush Forever (Government of Western Australia, 2000) and by the EPA (EPA, 2003, EPA, 2008, EPA, 2022). The EPA guiding principles have been adopted by initiatives such as Swan Bioplan (EPA, 2013) or the development of a Conservation Report for the Geraldton Regional Flora and Vegetation Study area (Zelinova *et al*, 2012).

Guidance for how biodiversity is considered in land use planning, including references to local biodiversity, are outlined in the following documents:

- Guidance for Planning and Development: Protection of naturally vegetated areas in urban and peri-urban areas (EPA, 2021)
- Guidance Statement No. 33: Environmental Guidance for Planning and Development (EPA, 2008)
- State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region (WAPC, 2010).

The Guidance for Planning and Development: Protection of naturally vegetated areas in urban and peri-urban areas (EPA, 2021) outlines the EPA's views and expectations for the protection of naturally vegetated areas in the design of urban and peri-urban development proposals. It applies to strategic planning, new schemes and scheme amendments, structure plans and subdivision and development proposals with the potential to impact on naturally vegetated areas.

The Guidance complements advice in the Guidance Statement No. 33: Environmental Guidance for Planning and Development (EPA, 2008), which outlines the EPA's broad principles for maintaining and protecting native terrestrial vegetation, flora and fauna and the EPA's objectives for biodiversity conservation. The Guidance Statement No. 33 lists the natural areas that the EPA considers are of high conservation significance, including critical environmental assets and high value environmental value assets. These criteria form the basis for local natural area prioritisation, used in the preparation of local biodiversity strategies. The Guidance Statement No. 33 considers it essential that natural areas of local conservation significance are identified and protected to meet community objectives and recommends using the Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region (Del Marco *et al*, 2004) to seek advice on identifying, protecting and managing locally significant natural areas.

Bush Forever and Urban Bushland Strategy

The State Government's expectation that Local Governments prepare local biodiversity strategies was set out in the Urban Bushland Policy (Government of Western Australia, 1995). This expectation was reiterated in the Bush Forever initiative (Government of Western Australia, 2000), which recognised the importance of 'local' natural areas as areas required to support the resilience of the State managed conservation reserve network.

Bush Forever is a strategic plan for bushland protection in the Perth Metropolitan Region, aiming to protect at least 10% of each ecological community represented on the Swan Coastal Plain portion of the metropolitan area. This plan is supported by detailed mapping, site selection criteria backed by research and varied implementation mechanisms that recognised the land use provisions at the time.

Bush Forever has been implemented under the State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region (WAPC, 2010) and the Metropolitan Region Scheme (MRS). The State Planning Policy 2.8 (SPP 2.8) outlines general measures for all Bush Forever Areas, with specific measures for five Bush Forever implementation categories. SPP 2.8 also reiterates the importance of protecting bushland outside the State's conservation lands through policy measures for 'local bushland', which provide for the preparation of local biodiversity strategies by Local Government.

In addition to the provisions of SPP 2.8, Bush Forever Areas are recognised as 'Environmentally Sensitive Areas' under the provisions of the EP Act. Exemptions for native vegetation clearing under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* do not apply in Environmentally Sensitive Areas.

The 2021 Bush Forever Audit demonstrated the effectiveness of this policy. The audit found that 99% of the 51,200 hectares of significant bushland identified in 2000 remained bushland. Areas with increased protection via the Parks and Recreation reservation under the Metropolitan Region Scheme had been achieved for 89% of the sites in 2021 compared to the 65% in 2000 (Department of Planning, Lands and Heritage, 2021).

Outside the Metropolitan Region, regionally significant areas were identified via the Swan Bioplan Project and biodiversity conservation prioritisation processes undertaken by regional Natural Resource Management (NRM) groups. The Swan Bioplan Project documented the vegetation and flora of the Swan Coastal Plain south of the Perth Metropolitan Region and across the adjoining Whicher and Darling Scarps in three reports (Keighery *et al*, 2010, Webb *et al,* 2009, Keighery *et al,* 2008). In 2010, the EPA endorsed the use of Swan Bioplan-Peel Regionally Significant Natural Areas information to guide strategic land use and conservation planning in the Peel region (EPA, 2013).

Measuring and describing biodiversity

What is biodiversity?

Western Australia's principal legislation for biodiversity conservation, the BC Act, defines biodiversity as:

> *the variability among living organisms and the ecosystems of which those organisms are a part and includes the following:*
>
> *a) diversity within native species and between native species*
>
> *b) diversity of ecosystems*
>
> *c) diversity of other biodiversity components.*

Ecosystems refer to all the living and non-living parts of a natural system that interact as a functional unit.

Biodiversity components include native species, habitats, ecological communities, genes, ecosystems and ecological processes.

Australia's nature is unique and diverse. Being one of only 17 countries in the world classified as biologically megadiverse, its biodiversity is globally important. The South West of Western Australia, extending from the World Heritage listed Shark Bay to Esperance, is recognised internationally as one of 36 hotspots for biodiversity – that is, areas with a high number of endemic species under threat due to numerous factors. It is estimated that about 58% of plants recorded so far in this region were not recorded anywhere else and new species are still being discovered.

Biodiversity data

For the purposes of local biodiversity planning, a range of data are used as surrogates for biodiversity. This includes the types and condition of native vegetation, wetlands, waterways and where known, information on species presence, species diversity or the presence of their habitat.

Ecological communities are naturally occurring groups of plants, animals and other organisms interacting in a particular type of habitat. The scale at which they are defined depends on the level of detail in the available information source. For a given region, ecological communities are interpreted at the level of the most detailed regional data available (Del Marco *et al,* 2004). In the South West of Western Australia, most local biodiversity strategies use vegetation complexes mapping (Webb *et al*, 2016) as a surrogate for ecological communities. Where vegetation complexes mapping is not available, Local Governments rely on a combination of broader scale vegetation type mapping such as the Statewide mapping of vegetation associations (Beard *et al,* 2013) with local scale vegetation assessments such as the Albany (Sandiford and Barrett, 2010) and Geraldton (WAPC, 2011) regional vegetation surveys.

What is a local biodiversity strategy?

A local biodiversity strategy provides for the identification and prioritisation of locally significant natural areas, the assessment of local opportunities and constraints to protection of significant natural areas and the identification of ways to achieve local biodiversity conservation objectives and targets.

Key features of an effective local biodiversity strategy

- A focus on local natural areas, including biodiversity, on public and private lands
- Objectives and targets are based on spatial analysis and consistent endorsed criteria, and are considered in the regional context
- A bushland protection map and/or local conservation priorities maps
- An Action Plan that integrates biodiversity consideration into all areas of Local Government business and decision making
- Having been prepared in consultation with relevant stakeholders and endorsed by the Council.

Local natural areas (LNAs) are defined as natural areas that exist outside lands managed by the Department of Parks and Wildlife, Regional Parks and Bush Forever Areas (Del Marco *et al,* 2004). They include private and public lands.

For the purposes of local biodiversity planning, natural areas are areas that contain native species or communities in a relatively natural condition and hence contain biodiversity. They can be areas of native vegetation, vegetated or open water bodies, waterways, springs, rock outcrops, caves, sand dunes or cliffs (Del Marco *et al,* 2004).

Parkland cleared areas (areas with remnant trees but weedy understorey), isolated trees in cleared settings, ovals and turfed area are not included in the spatial analysis for LNA prioritisation. However, they can be considered when identifying ecological linkages as areas where targeted revegetation might be feasible to build connectivity between conservation areas.

Lands in Regional Parks and Bush Forever Areas that are managed by Local Government are still included in the scope of a local biodiversity strategy.

To maximise the benefits of local biodiversity strategies, they should:

- Be based on a State Government recognised set of prioritisation criteria, supported by legislation, policy and documented best practice
- Consider local priorities in the regional context
- Consider relevant local conditions and strategic priorities
- Identify locally significant biodiversity spatially (on a map or series of maps)
- Be developed with adequate community input, including by Elected Members.

While there is no mechanism for formal endorsement of local biodiversity strategies by the State, Local Government decision making supported by a local biodiversity strategy can be considered by State Government agencies. There are two key areas of consideration:

1. State level recognition of local biodiversity conservation objectives can be achieved through the endorsement of a local planning strategy by WAPC. This could occur when the local planning strategy includes objectives for local biodiversity that are based on a local biodiversity strategy prepared:
    - In accordance with the endorsed methodology
    - In consultation with relevant stakeholders
    - That is endorsed by the Council.
2. Local biodiversity strategies can be considered in assessments of native vegetation clearing permit applications made under Part V of the EP Act (State of Western Australia, 2014).

Other types of strategic plans prepared by Local Governments, such as greening plans, wildlife corridor strategies, environmental strategies or reserve inventories, can inform a local biodiversity strategy but are not a substitute.

The scope of local biodiversity planning is guided by the tenure type of LNAs. Where all remaining natural areas within a Local Government boundary are on lands already reserved for public use and none remain in private ownership (freehold land), biodiversity planning focuses on ways to manage these lands for agreed biodiversity conservation outcomes. This includes improving the protection levels of high priority areas, prioritising on-ground management and improving ecological connectivity between the protected lands. An example of a plan that focuses on management of Local Government managed reserves is the Town of Cambridge Natural Area Strategy 2022-2032 (Town of Cambridge, 2022), which includes planning for ecological linkages through a joint initiative by the Western Suburbs Region Organisation of Councils. The Western Suburbs Greening Plan 2020-2025 (Ecoscape, 2020) identified and prioritised ecological linkages across six member Local Governments.

Where LNAs remain on private and public lands, identifying opportunities for management of biodiversity across all land tenures needs to be covered by the local biodiversity strategy scope, even where final decisions on land use or development are subject to State Government processes. Local biodiversity strategies should be a strategic document covering all LNAs, setting out processes for considering biodiversity in all Local Government decisions over a five to ten year period. Local biodiversity strategies that cover LNAs on private and public lands, including those managed by Local Government, are the focus of these Guidelines.

Biodiversity unique to Local Government areas

Since 2000, the South West of Western Australia has been internationally recognised as a hotspot for biodiversity (Myers *et al*, 2000). This is due to the rich diversity of plant species, with a high number of these only found in this region. The hotspot status also recognises that this unique biodiversity is threatened.

Many of the endemic plants are naturally rare, found in a small number of locations and listed as threatened under Australian and/or State Government legislation. Some of these plants are only known to occur on lands managed by Local Government, often on roadsides.

There are also vegetation types that represent unique ecological communities and are mapped within a single Local Government area.

Many of these unique plants and mapped plant communities are not present on lands managed for conservation by the State Government and their conservation is dependent on management by Local Government or local planning scheme provisions.

Can a local biodiversity strategy cover more than one Local Government area?

It is recommended that a local biodiversity strategy cover a single Local Government area to facilitate integration into the Local Government's corporate and land use planning processes.

Collective local biodiversity strategies can be effective in inner metropolitan areas where the focus is on management and increasing the viability of reserved natural areas by improving connectivity (Local Biodiversity Program, 2014; Eastern Metropolitan Regional Council, 2008). The benefits of working collectively include the sharing of resources required for the preparation of the strategy and more effective consideration of environmental matters that cross the administrative boundaries of a single Local Government. In outer metropolitan and rural regions, sharing a specialist (e.g. Environmental Officer) responsible for preparing the strategies can be a cost-effective approach to local biodiversity planning. For example, the Shire of Toodyay and the Shire of Victoria Plains shared the cost of employing an Environmental Officer in 2024-2025 to prepare a local biodiversity strategy for each Shire.

However, whether preparing a single strategy covering multiple Local Governments or having multiple strategies prepared via a shared resource, it is important that the local biodiversity strategy's implementation actions reflect each Local Government's circumstances and support effective integration into local planning schemes, policies and procedures.

How local biodiversity strategies can be used

Local biodiversity strategies inform:

- Strategic local land use planning (preparation of local planning strategies)
- Statutory land use planning (local planning policies, compliance with local planning scheme provisions)
- Design and efficient delivery of Local Government projects impacting native vegetation, including offsets (e.g. local road upgrade, community facilities)
- Prioritisation of resourcing for natural areas vested in Local Government for management.

Principles for local biodiversity planning

The nine guiding principles outlined in the Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region (Del Marco *et al,* 2004) remain relevant and are consistent with the biodiversity conservation principles set out by the EPA (EPA, 2008). These principles should be reflected in the objectives and targets for local biodiversity strategies and how implementation actions are prioritised.

Principle 1: Retention of at least 30% of the pre-European extent of each ecological community is required to prevent an exponential loss of species and failure of ecosystem processes

Adequate representation of ecological communities across the landscape is required to conserve biodiversity and maintain ecosystem functions. The threshold for the retention of 30% of the pre-European extent for each ecological community has been long recognised as necessary to prevent the exponential loss of species and failure of ecosystem processes. Where less than 10% of pre-

European extent of an ecological community remains, that community is considered threatened (Figure 1).

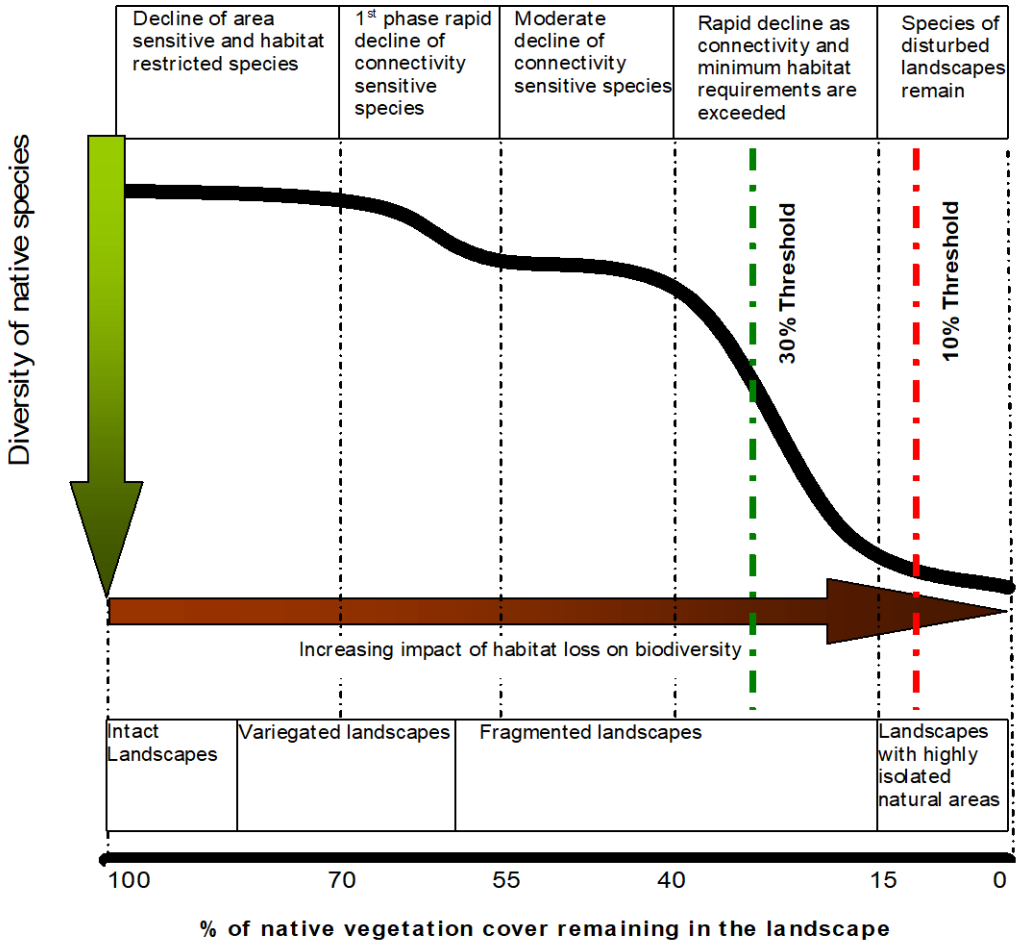


Figure 1: Biodiversity loss in relation to native vegetation loss (Smith and Siversten, 2001)

The 30% threshold is reflected in international, national and State strategies and policies on biodiversity conservation, including the Kunming-Montreal Global Biodiversity Framework and the Australian Government's Nature Positive Plan that seeks to protect 30% of Australia's lands and seas by 2030 (DCCEEW, 2022). In Western Australia, the need to retain, protect and regenerate threatened ecological communities and ecological communities that are below 30% of their pre-European extent are an important consideration in decision making (Government of Western Australia, 2010; EPA, 2008). Threatened ecological communities and species should be fully protected and recovered to sustainable levels.

A guide to the assessment of applications to clear native vegetation under Part V of the EP Act (State of Western Australia, 2014) identifies several landscape characteristics of where biodiversity should be maintained, including the representation levels of ecological communities that might need to be increased considerably above 30%. This includes:

- Bioregions with high levels of habitat fragmentation
- Ecosystems with high levels of degradation
- Naturally rare or restricted ecological communities
- To maintain some ecosystem services.

Principle 2: Protect regionally and locally significant natural areas

Natural areas of conservation significance are identified and protected via various State Government processes, such as assessments under Part IV of the EP Act (EPA, 2008; EPA, 2024), forest management and conservation reserve planning undertaken by DBCA and the Conservation and Parks Commission (Conservation and Parks Commission, 2023; DBCA, 2022) or the Bush Forever initiative (Government of Western Australia, 2000). However, it has been recognised that to conserve biodiversity, the State's conservation reserves network needs to be supported by a matrix of smaller locally significant natural areas (Government of Western Australia, 2010; EPA, 2008; Government of Western Australia, 2000).

LNAs have significant conservation value, with many meeting the ecological criteria for regionally significant areas:

- Contributing towards the 30% retention and protection of ecosystems, adding to areas managed by the State or identified as priority for protection via regional planning processes
- Providing habitat for threatened species and ecological communities
- Buffering and connecting protected and State managed natural areas
- Providing environmental services and benefits for the local community.

Local protection improves conservation of biodiversity at regional levels

In 2020 the Shire of Mundaring's Local Planning Scheme reserved over 6,000 hectares of native vegetation as local conservation reserve, improving the regional protection level of two vegetation complexes by more than 1% of their pre-European extent.

In the Shire of Augusta-Margaret River, of the 57 vegetation complexes mapped in the Shire, 33 are not mapped outside the Shire boundary. Natural areas representative of eight of these restricted vegetation complexes are protected only through the Shire's Local Planning Scheme provisions of three zones: Bushland Protection, Leeuwin-Naturaliste Ridge Conservation and Southern Ocean Foreshore Protection. The Shire's Local Planning Scheme No. 1 (2022) also included development controls on lands within identified Regional Environmental Corridors.

Principle 3: Biodiversity is best conserved in-situ – protect what remains before revegetating

From an ecological and economic perspective, conservation of viable natural areas is the most effective way of protecting biodiversity. Once removed, natural ecosystems cannot be fully re-created and restoration outcomes are dependent on land manager capacity to support long-term investment in the process.

Revegetating cleared lands is important to create buffers, manage erosion and land salinity and build connectivity between protected areas. However, significant further research is needed to identify cost effective and viable methods for propagation and reintroduction of native plants, associated fungi and other organisms to restore biodiversity on cleared lands. This principle highlights the need to prioritise retention and management of protected natural areas over biodiversity restoration on cleared lands.

To facilitate in-situ conservation, all land use and development should be implemented with a view of meeting overall biodiversity objectives for the Local Government and its broader region.

Principle 4: Regeneration is a higher priority than revegetation

In natural areas with signs of degradation, assisted regeneration by activities such as weed control and management of disturbances by users is of higher priority than revegetation. It is more cost effective to control threatening processes in natural areas that retain some aspects of the original

ecosystem than revegetating cleared lands. The risks of introducing plants that were not part of the original natural ecosystem can also be avoided.

Principle 5: Prioritise protection and management of the highest biodiversity value natural areas

Natural areas with the highest biodiversity value should be prioritised for resource allocation. Local biodiversity planning helps with defining the criteria for identifying LNAs of high conservation significance based on known and likely presence of biodiversity and its recognised status under relevant legislation and policies.

Other considerations when prioritising resource allocation include long-term viability of the natural area and the type of threats that will need to be addressed through management. Processes that threaten biodiversity should be anticipated, prevented and managed to prevent degradation of the protected areas.

Principle 6: Support community involvement in biodiversity conservation

Biodiversity conservation requires consideration by all sectors of society. Engaging the local community in identifying, prioritising, protecting and managing important natural areas helps with securing support for biodiversity outcomes and supports a transparent and accountable planning process.

Principle 7: Biodiversity values must be made transparent in decision making

Transparency is a key principle of sustainability and good governance. Documenting and recognising the biodiversity values is critical to any decision making relating to natural areas, ensuring that any potential trade-offs made between development and biodiversity are accountable and transparent to the community.

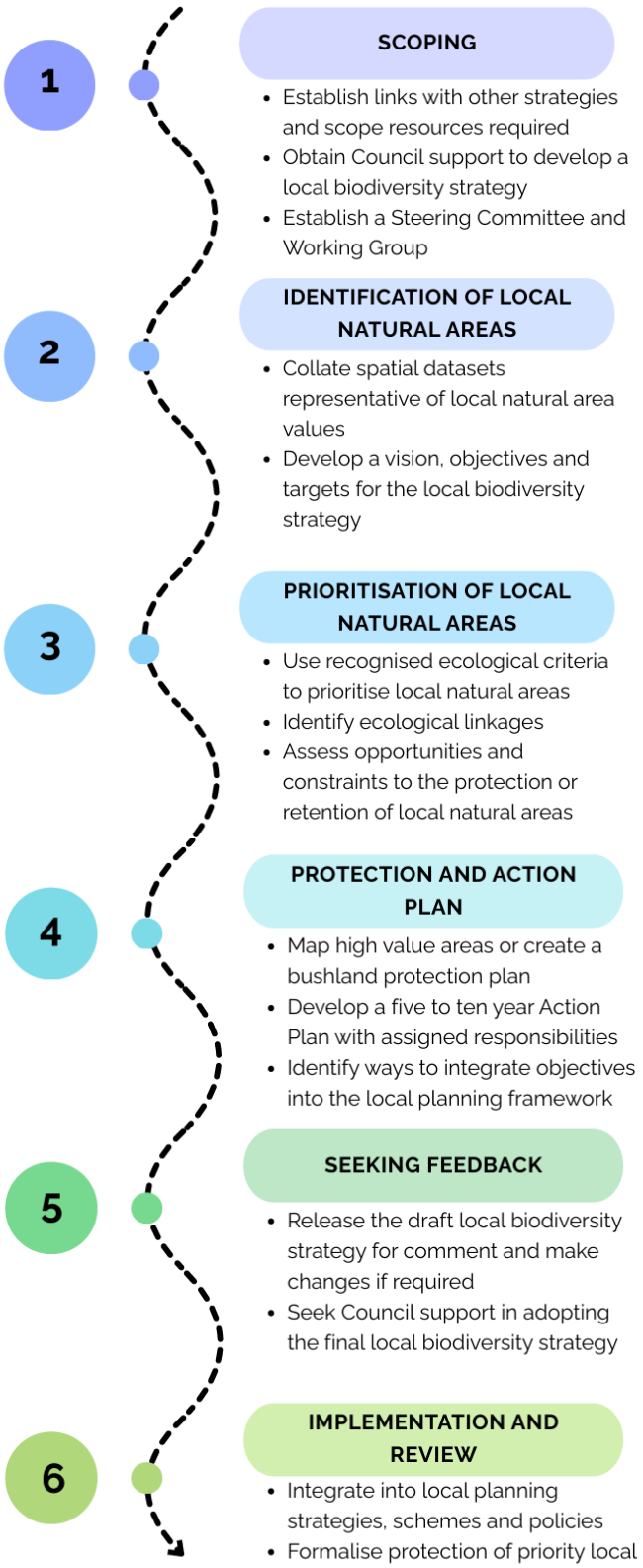
Principle 8: Site-specific field survey is essential to understand biodiversity value

While access to data that supports biodiversity value assessments is growing, these data have limitations. For example, the scale at which biodiversity data are mapped can be suitable for strategic landscape scale planning but are not recommended for site-specific decision making. Another limitation is due to biological surveys not being undertaken systematically across regions; instead, they are targeted at specific locations subject to environmental assessments, leading to significant differences in data availability across Local Government areas. To support site-specific decisions, and to improve understanding of biodiversity management requirements, field assessments are needed to confirm the presence and the condition of ecological values.

Principle 9: Natural area conservation is a legitimate land use

Retention and conservation of natural areas across the landscape have multiple benefits, providing environmental infrastructure that supports all land uses. In addition to the intrinsic, scientific and cultural values, in rural settings natural areas help to minimise land degradation and support regenerative agriculture, and in urban settings moderate local climate and provide multiple health benefits to local communities. Thus, providing for biodiversity conservation across all land uses is a valid land use planning consideration.

Local biodiversity planning process



1. Scoping

The local biodiversity planning process provides a strategic framework for consideration of biodiversity, supporting the operationalisation of environmental goals in Local Government Strategic Community Plans and local planning strategies and the prioritisation of natural asset management.

To initiate this process, Local Government should:

- Establish the links with higher level Local Government strategies
- Scope the resources required to undertake the process, such as the capacity to undertake the process internally or the level of external expertise required
- Obtain Council support for the development of a local biodiversity strategy
- Establish a Steering Committee and a Working Group to form the local biodiversity strategy development team.

A multidisciplinary approach is needed to ensure cross-organisational adoption of actions to achieve the local biodiversity management goals.

The role of the Steering Committee is to facilitate the development of the local biodiversity strategy, help with defining the vision, objectives and targets and provide feedback on any technical and consultative issues that arise. It is recommended that the Steering Committee operates under agreed Terms of Reference (see Appendix 2) and consist of the following representatives:

- Two Elected Members
- Executive Manager/Manager from the directorate with responsibility over land use planning and asset management
- Community representatives with knowledge of natural resource management and local biodiversity
- Indigenous representative body.

The role of the Working Group is to review the technical aspects of the planning process and help identify feasible actions for improved biodiversity outcomes. This group should consist of staff from the varied Local Government directorates that will be responsible for implementing the Local Biodiversity Strategy Action Plan.

See Appendix 1 for more information on preparing a local biodiversity strategy.

2. Identification and mapping of LNAs

LNAs are natural areas that exist outside lands managed by the Department of Parks and Wildlife, Regional Parks and Bush Forever Areas. Lands managed by Local Government that form parts of Regional Parks or Bush Forever Areas are classified as LNAs for the purposes of local biodiversity planning.

Mapping of native vegetation extent and wetlands are used as surrogates for natural areas and form the base layer for the identification of LNAs and their prioritisation.

LNAs are identified by intersecting the best available native vegetation extent mapping with the mapping of lands managed by DBCA and mapping of Regional Parks and Bush Forever Areas (Figure 2). The intersect results in a new layer, referred to as 'administrative planning categories', that is used to calculate the percentage of LNAs in a Local Government area. Wetlands mapping is included in the next step as one of the ecological criteria informing the prioritisation of LNAs.

While the main objective is to map LNAs, it can be useful to further classify non-LNA lands to identify overlaps between Bush Forever Areas, DBCA managed lands and Regional Parks. Reserves or tenure data overlays need to be used to identify any Local Government managed lands within Regional Parks and Bush Forever Areas to reclassify these lands in the administrative planning categories mapping as LNAs. Alternatively, an overlay mapping layer can be created to identify all lands managed by Local Government, including Crown reserves and freehold land.

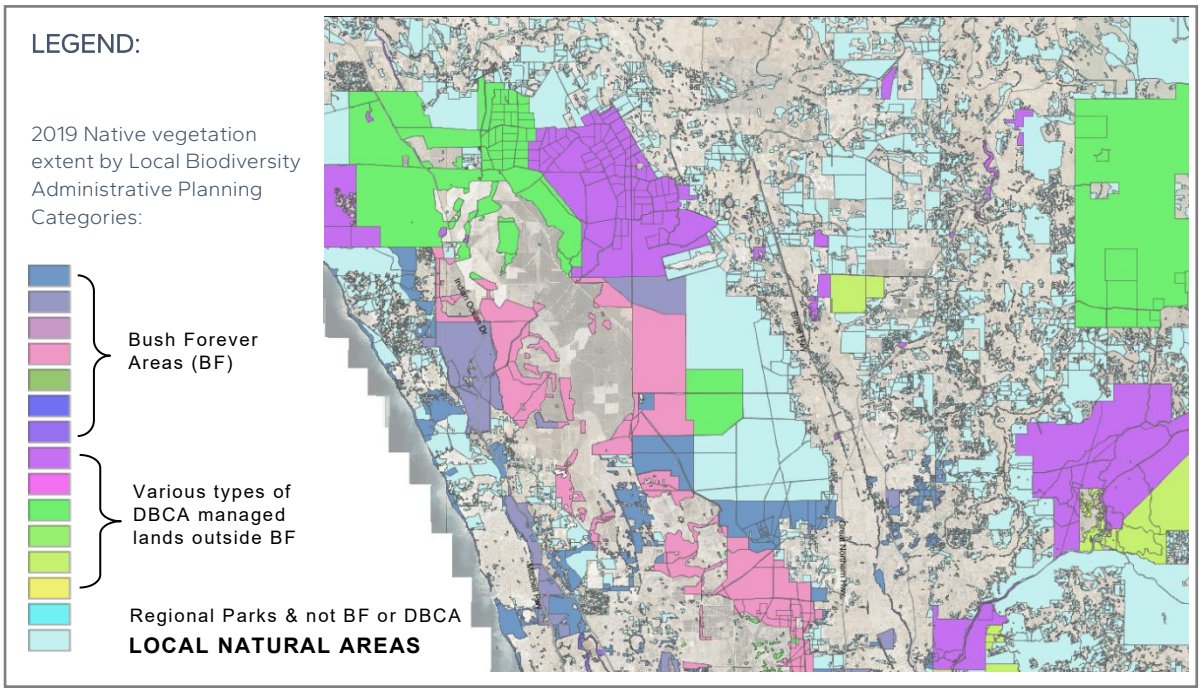


Figure 2: The local biodiversity planning process focuses on Local Natural Areas (WALGA, 2020)

2.1 Setting the vision, objectives and targets

The vision and objectives state the desired outcomes from implementing the local biodiversity strategy and aid common understanding amongst stakeholders on what are they working towards. There should be a clear link between the vision, objectives and targets, and each should be developed with active involvement from Elected Members and community representatives (Figure 3).

A long-term (25-30 years) objective should be established based on the total amount of natural areas to be retained and protected. Conservation targets, set for 10-20 year timeframes, will inform the Action Plan and help with evaluating the effectiveness of the implemented actions.

When setting the vision and objectives, the following should be considered:

- Australian and State Government legislation and policy
- National objectives and targets such as Australia's Strategy for Nature 2024-2030 (Commonwealth of Australia, 2024), Australia's Strategy for the National Reserve System 2009-2030 (Commonwealth of Australia, 2010) and the Threatened Species Action Plan 2022-2032 (Australian Government, 2022)
- Local Government Strategic Community Plan
- The status of LNAs.

Figure 3: Vision and objectives setting for the Shire of West Arthur Local Biodiversity Strategy in Darkan.

Photo credit: R Zelinova

While a vision is a broad aspirational statement, objectives and targets should be SMART:

- Specific – clearly define what will be achieved (e.g. increased protection, active management, adoption of a local planning policy)
- Measurable – set ways of measuring what will be achieved (e.g. number of hectares of specific vegetation type with increased protection, number of hectares of specific threatened ecological community actively managed)
- Achievable – the objectives should consider the resourcing within Local Government and opportunities for partnerships
- Relevant – the targets and objectives should contribute towards achieving the vision
- Time-bound – the implementation timeframe should be realistic and meaningful.

Without measurable targets, the effectiveness of actions cannot be evaluated, and adaptive measures cannot be triggered. For example, a typical local biodiversity strategy objective is the conservation of adequate representation of vegetation types within a Local Government area. Without determining what 'adequate representation' means, there is no way of identifying what actions in which locations are needed to achieve the objective.

Objectives and targets should be reviewed and revised where necessary, considering updates to data that inform the status of biodiversity components, changes in State Government policies or changes to best practices.

3. Prioritisation of LNAs

All natural areas retain biodiversity and provide ecosystem services. Natural areas in modified landscapes (Figure 4) provide benefits of preserving unique biodiversity, providing space for recreational or tourism activities, providing access to green spaces for surrounding residents, delivering ecosystem services such as moderation of heat island effects associated with dense urban landscapes, supporting water quality management and facilitating the movement of pollinators.

The next step in the local biodiversity planning process is to establish the ecological criteria for assessing the local priorities for biodiversity conservation. Application of these ecological criteria provides for early identification of matters that might trigger regulatory processes and inform priorities for protection and resource allocation for management of biodiversity in conservation reserves.

The first guidance on identifying 'locally significant natural areas' was published in the Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region (Del Marco *et al*, 2004). The first ecological criteria to identify locally significant natural areas were an adaptation of the Bush Forever ecological criteria and the local significance criteria proposed in the Urban Bushland Strategy (Government of Western Australia, 1995). The methodology was endorsed by the Office of the EPA (2004) and WAPC (2007) and is still used by Local Government.

Figure 4: Manea Park adjoining the residential area at College Grove, Bunbury.

Photo credit: J Henderson

3.1 Ecological criteria for LNA prioritisation

The ecological criteria for identifying locally significant natural areas described here are consistent with the EPA criteria (EPA, 2008) for significant natural areas and the criteria for locally significant natural areas used by Local Governments since the publication of the first Local Biodiversity Planning Guidelines (Del Marco *et al,* 2004 and Molloy *et al*, 2007). The criteria reflect environmental factors supported by environmental regulations and policies that can be represented by mapping data.

The recommended criteria provide for a consistent approach to prioritisation, ensuring factors important to maintaining biodiversity are considered within each Local Government area.

The standard ecological criteria for local biodiversity planning include:

- Representation of ecological communities (regional and local)
- Diversity
- Rarity
- Maintenance of ecological processes or natural systems (connectivity)
- Protection of wetland, streamline, estuarine and coastal vegetation
- Areas of recognised international, national or regional values which could include areas of scientific or evolutionary importance.

Table 1 describes each criteria type and provides examples of datasets used as surrogates to represent these criteria. Some datasets are not available across the whole South West of Western Australia. The local biodiversity planning process facilitates the establishment of an environmental information baseline for a Local Government, using the best available data for the local area. Identified data gaps can be highlighted and opportunities for addressing these gaps can be investigated.

The ecological criteria are applied to all mapped natural areas in a Local Government area, not only LNAs. This tenure blind application of the prioritisation process supports the identification of ecological linkages and allows for the consideration of local conservation priorities in a broader context of protected areas managed by the State and the consideration of landscape scale factors.

The representation of ecological communities is considered at two scales:

- Bioregional level – regions or subregions as determined by the Interim Biogeographic Regionalisation for Australia (IBRA); the nationally agreed regionalisation used as a framework for establishing the national system of conservation reserves (Thackway and Gresswell, 1995)
- Local Government area.

Table 1: Ecological criteria for local biodiversity planning

Criterion		Description	Examples of mapping data used to represent these criteria*
Regional representation			
1.1	Any natural area with recognised international, national, State or regional conservation value	The aim of this criterion is to identify LNAs that are not yet formally protected but have been identified through previous studies as having high conservation values. To reduce the risk of errors in spatial modelling, the prioritisation criteria are applied to the native vegetation extent mapping as a baseline and, therefore, the prioritisation results include lands with varied levels of protection. These results can be presented by cutting them to lands that are classified as LNAs or displaying them with an overlay of protected areas.	DBCA managed lands (legislated lands)
			Regional Parks
			Crown Reserves vested for conservation (not managed by DBCA)
			Bush Forever Areas
			Peel Regionally Significant Natural Areas
			Ramsar Wetlands
			Directory of Important Wetlands
			Conservation Covenants
			Proposed conservation reserves
1.2	Natural areas of an ecological community with only 1500 ha or 30% or less (whichever is greater) of their pre-European **extent remaining** in the IBRA sub-region	The most up-to-date native vegetation extent mapping by vegetation type mapping is used to generate statistics to identify vegetation types meeting the criteria threshold. Vegetation complexes, and other vegetation type mapping, are used as a surrogate for ecological communities.	2020 vegetation extent by vegetation complexes
			2020 vegetation extent by Statewide pre-European vegetation mapping
			DBCA Statewide Vegetation Statistics and DBCA South West Vegetation Complex Statistics
1.3	Large (greater than 20 hectares or smaller thresholds in areas with high levels of historical clearing), viable natural areas (in good or better condition) of an ecological community with over 30% of its pre-European extent	For the purposes of LNA prioritisation, polygons of mapped remnant vegetation larger than 20 hectares and representative of vegetation types retained above the 30% threshold are identified. In areas with high levels of vegetation fragmentation, such as agricultural cropping regions or urban areas, ten or four hectares thresholds are used. Vegetation condition mapping is rarely available for the whole Local Government area. It is considered in Local Government	2020 vegetation extent by vegetation complexes by mapped polygon size
			2020 vegetation extent by Statewide pre-European vegetation mapping by mapped polygon size
			DBCA Statewide Vegetation Statistics and DBCA South West Vegetation Complex Statistics

	remaining in the IBRA sub-region	managed reserves where vegetation condition assessments have been completed.	
1.4	Of an ecological community with limited natural occurrence within a conservation planning area (e.g. 100% or more than 90% of the original mapped extent)	Pre-European extent of some vegetation types is geographically restricted, with some only mapped within a defined biodiversity conservation planning area, such as Perth and Peel Region Scheme areas, NRM regions or a Local Government area. While such vegetation types might be captured in one of the ecological community representation criteria, this criterion helps to highlight vegetation types that should be a high priority for conservation within a local conservation planning area. For example, there are seven vegetation complexes restricted to the Perth and Peel region portion of the Swan Coastal Plain IBRA region.	2020 vegetation extent by vegetation complexes and a conservation planning area boundary 2020 vegetation extent by Statewide pre-European vegetation mapping and a conservation planning area boundary DBCA Statewide Vegetation Statistics and DBCA South West Vegetation Complex Statistics
1.5	Of an ecological community with only 1500 ha or 15% or less **protected** for conservation in the Jarrah Forest sub-regions	While significant portions of ecological communities in the Jarrah Forest IBRA region are protected and/or managed for conservation in accordance with the State's Forest Management Plan (Conservation Commission Of Western Australia, 2022, 2013 and 2003), several vegetation complexes are mapped as occurring on lands with limited opportunities to achieve adequate protection via the Forest Management Plan implementation. The objective of this criterion is to prioritise these vegetation complexes for conservation via alternative mechanisms.	2020 vegetation extent by vegetation complexes and IBRA sub-regions DBCA South West Vegetation Complex Statistics
1.6	Of an ecological community with only 400 ha or 10% or less **protected** for conservation on the Swan Coastal Plain portion of Perth and Peel	In the Perth Metropolitan Region, the Bush Forever initiative (Government of Western Australia, 2000) set out conservation targets for the Swan Coastal Plain vegetation complexes. The aim of this criterion is to identify opportunities to increase the protection of vegetation complexes where the Bush Forever implementation could not achieve the minimal 10% protection. In 2012, this criterion was extended to include the Peel Region Scheme area. The 2021 Bush Forever Audit (Department of Planning, Lands and Heritage, 2021) identified that nine of the targeted 26 vegetation complexes had less than 10% protected via Bush Forever implementation.	DBCA South West Vegetation Complex Statistics 2020 vegetation extent by vegetation complexes and Region Scheme Boundaries

Local representation			
1.7	Natural areas of an ecological community with 10% or less remaining within the Local Government area	The most up-to-date native vegetation extent mapping by vegetation type mapping is used to generate statistics to identify vegetation types meeting the criteria threshold. Vegetation complexes, and other vegetation type mapping, are used as a surrogate for ecological communities.	DBCA South West Vegetation Complex Statistics 2020 vegetation extent by vegetation complexes and Local Government boundaries
1.8	Natural areas of an ecological community with 30% or less remaining within the Local Government area	The most up-to-date native vegetation extent mapping by vegetation type mapping is used to generate statistics to identify vegetation types meeting the criteria threshold. Vegetation complexes, and other vegetation type mapping, are used as a surrogate for ecological communities.	DBCA South West Vegetation Complex Statistics 2020 vegetation extent by vegetation complexes and Local Government boundaries
1.9	Large (greater than 20 hectares or smaller thresholds in areas with high levels of historical clearing), viable natural areas (in good or better condition) of an ecological community with over 30% of its pre-European extent remaining in the Local Government area	This criterion is not usually included in LNA prioritisation mapping but is used to prioritise Local Government managed reserves.	2020 vegetation extent by vegetation complexes by mapped polygon size 2020 vegetation extent by Statewide pre-European vegetation mapping by mapped polygon size DBCA Statewide Vegetation Statistics and DBCA South West Vegetation Complex Statistics
Rarity			
2.1	Of an ecological community with only 1500 ha or 10% **remaining** in the IBRA sub-region	Rarity refers to the scarcity of ecological communities measured with the best available vegetation type mapping. The restricted distribution can be due to naturally restricted distribution, or due to extensive historical clearing across the natural range.	2020 vegetation extent by vegetation complexes 2020 vegetation extent by Statewide pre-European vegetation mapping DBCA Statewide Vegetation Statistics and DBCA South West Vegetation Complex Statistics

2.2	Of an ecological community with only 400 ha or 10% or less **remaining** in the Bush Forever and Peel section of the Swan Bioplan Areas	In the Perth Metropolitan Region, the Bush Forever initiative (Government of Western Australia, 2000) set out conservation targets for the Swan Coastal Plain vegetation complexes. The aim of this criterion is to identify opportunities to increase the protection of vegetation complexes where the Bush Forever implementation could not achieve the minimal 10% protection. In 2012, this criterion was extended to include the Peel Region Scheme area. The 2021 Bush Forever Audit (Department of Planning, Lands and Heritage, 2021) identified that nine of the targeted 26 vegetation complexes had less than 10% protected via Bush Forever implementation.	DBCA South West Vegetation Complex Statistics 2020 vegetation extent by vegetation complexes and Region Scheme Boundaries
2.3	Natural areas containing a Threatened Ecological Community (TEC)	Threatened ecological communities are listed under Australian and State Government legislation. A dataset including the buffers of mapped and inferred TECs is used for strategic conservation planning.	Threatened ecological communities data layer with conservation categories, including priority ecological communities maintained by the Species and Communities Branch of DBCA
2.4	Natural areas containing records of threatened flora, fauna or significant habitat for threatened fauna	Buffered records of threatened species listed under Australian and State Government legislation are used. A 50 metre buffer to records data is applied, consistent with the consideration of threatened flora as Environmentally Sensitive Areas under section 51B of the EP Act. The 50 metre buffer is applied to fauna records to facilitate visual representation in multicriteria spatial analysis. Threatened fauna habitat mapping can be used where available.	Threatened flora and fauna data layer with conservation categories maintained by the Species and Communities Branch of DBCA • Carnaby's Black Cockatoo habitat (feeding, roosting, breeding) • Western Ringtail Possum Habitat Suitability Significant birding sites (BirdLife Australia)
2.5	Natural areas containing a priority ecological community	Priority ecological communities as listed by the Species and Communities Branch of DBCA.	Threatened ecological communities data layer with conservation categories, including priority ecological communities maintained by the Species and Communities Branch of DBCA
2.6	Natural areas containing priority flora, fauna or	A 50 metre buffer is used to map priority species listed under State Government legislation, without the specific location of	Threatened flora and fauna data layer with conservation categories maintained

	significant habitat for these fauna	the priority species being identified. Priority fauna habitat mapping is included where available.	by the Species and Communities Branch of DBCA • Potential Quenda habitat
Diversity			
3.1	Natural areas in good or better condition that contain upland and wetland structural communities	The EPA describes diversity as areas of high diversity of landforms, flora and/or fauna species or communities in close association (EPA, 2008). This criterion is used in reserve prioritisation only.	Not used in multicriteria spatial analysis for LNA prioritisation
3.2	Natural areas with high diversity of species	Vegetation type mapping at finer scale than vegetation complexes, where information on flora species richness was recorded, has been used to identify natural areas with comparative higher species diversity.	Albany Vegetation Units (AVUs) with the highest potential fauna habitat count Remnant patches with more than 3 AVUs AVUs with the indicative highest flora species
Maintaining ecological processes or natural systems			
4.1	Natural areas acting as stepping stones in a regionally or locally significant ecological linkage	Maintenance of connectivity between protected areas at the regional and local level is a key consideration in local biodiversity planning. Natural areas partly or wholly within a designated regional or local linkage are considered to meet this criterion. Regional linkages are identified via broad landscapes, connecting regionally significant natural areas. Local ecological linkages are identified via local biodiversity strategies. See section 3.2 of this document for more information on identifying ecological linkages at regional and local scales.	Perth Regional Ecological linkages (2004) South Coast Macro Corridors (2006) South West Regional Ecological Linkages (2009) Geraldton regional and local ecological linkages (2010) Chittering regional and local ecological linkages (2010)
Protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation			
5.1	Wetlands with an appropriate buffer	Significant wetlands mapped with a 50 metre buffer. While adequate wetlands buffers need to be determined for each wetland under assessment, the use of the 50 metre buffer for all mapped wetlands within a Local Government area highlights priority areas requiring further consideration. It is important to understand the differences in methodologies used in the varied	Conservation Category and Resource Enhancement Wetlands in the Geomorphic Wetlands of the Swan Coastal Plain South Coast Significant Wetlands Wheatbelt Wetlands

		wetlands mapping studies across the South West of Western Australia. For example, wetlands mapping for the Wheatbelt uses different methodology to the geomorphic wetlands mapping available for the Swan Coastal Plain, Augusta to Walpole, Cervantes, Manjimup to Northcliffe and other parts of the South West.	Geomorphic wetlands mapping for Cervantes – Eneabba, Darkan-Duranillin, Leeuwing Naturaliste Ridge, Donnybrook to Nannup, Manjimup to Northcliffe, Augusta to Walpole
5.2	Riparian vegetation along rivers, creeklines and other channel wetlands, with an appropriate buffer	Buffered hydrography lines are intersected with remnant vegetation mapping to create a representation for this criterion. In Perth and Peel regions, major streams were buffered by 100 metres on each side of the mapped stream, and other mapped streams were buffered by 50 metres (Perth Biodiversity Project, 2012).	Modelled layer using hydrography lines that can be extracted from Landgate's medium scale Topographic Geodatabase
5.3	Floodplains delineated based on ecological and geomorphic features, with an appropriate buffer	Where available, buffered floodplain mapping data is intersected with remnant vegetation extent mapping. In Perth and Peel regions, a 50 metre buffer was used (Perth Biodiversity Project, 2012).	Modelled layer – buffered floodplain area mapping (dataset maintained by DWER)
5.4	Estuarine fringing vegetation with an appropriate buffer	Where available, buffered estuarine mapping data is intersected with remnant vegetation extent mapping. In Perth and Peel regions, a 100 metre buffer was applied to 'Estuarine' polylines (Perth Biodiversity Project, 2012).	Modelled layer using hydrography lines that can be extracted from Landgate's medium scale Topographic Geodatabase
5.5	Coastal vegetation on the foredunes and secondary dunes	Remnant vegetation extent mapping intersected with a mapping layer representative of foredunes and secondary dunes. In Perth and Peel regions, the extent of foredunes and secondary dunes was based on the selected Soil Landscape Units (subsystems Q3 and Q4) and were not mapped. Coastal type vegetation within 150 metres from the coastline was included (Perth Biodiversity Project, 2012).	Modelled layer based on Soil Landscape mapping – best available (DPIRD)

*****Many of the mapping datasets listed in Table 1 are available via DataWA, the online portal of Western Australia public sector data.

There are two vegetation type mapping datasets used to interpret ecological communities in the South West of Western Australia: vegetation complexes and vegetation associations. Vegetation complexes mapping was adopted as a surrogate for interpreting ecological communities in the Local Biodiversity Planning Guidelines for Local Governments in the Perth Metropolitan Region and the South West Biodiversity Project area (Del Marco *et al,* 2004; Molloy *et al*, 2007).

Vegetation complexes mapping represents a pattern of vegetation at a regional scale, based on key determining factors of landform, soil and climate. There are two vegetation complexes datasets covering parts of the South West of Western Australia:

- Swan Coastal Plain vegetation complexes (Heddle *et al, 1980)* as updated by Webb *et al,* (2016) and mapped at the scale of 1:250,000. This dataset shows pre-European distribution of vegetation complexes along the Swan Coastal Plain south of Lancelin, covering most of the Swan Coastal Plain bioregion.
- Vegetation complexes in the South West Forest Region of Western Australia (Mattiske and Havel, 1998) as updated by Webb *et al,* (2016) and mapped at the scale of 1:50,000. This dataset shows pre-European distribution of vegetation complexes of the South West forest region of Western Australia, covering most of the Jarrah Forest and Warren bioregions.

Where vegetation complexes mapping is not available, the Statewide pre-European mapping of vegetation associations based on J.S. Beard (DPIRD, 2018) is used. This mapping is available at the scale of 1:250,000 and is used to inform the regulatory and conservation planning process undertaken by the State (Government of Western Australia, 2019).

The Statewide mapping can be combined with suitable local scale vegetation type mapping, such as the Albany Regional Vegetation Survey (Sandiford and Barret, 2010), the Geraldton Regional Flora and Vegetation Survey (WAPC, 2010) or the North Batavia Coast Flora and Vegetation Survey (DBCA, 2011).

Where mapping of other matters relevant to biodiversity is available, it can be included to further inform the prioritisation process. For example, mapping of granite outcrops or karst features might be available for a local area.

The spatial representation of ecological criteria assists with identifying areas that are likely to support natural areas of high conservation value, making them a priority for further investigation as areas to contribute to conservation targets, environmental offsets or when considering future development, whether at strategic land use planning stage or at development approval stage.

Several approaches to spatial representation of the ecological criteria can be used in local biodiversity strategies. Table 2 list the benefits and limitations of different approaches to spatial representation of ecological communities.

Table 2: Comparison of various approaches to the mapping of ecological criteria used in local biodiversity planning

Approaches to the mapping of ecological criteria	Advantages	Limitations	When to use
Mapping of specific ecological criteria as static maps in a local biodiversity strategy (e.g. native vegetation extent by vegetation types, native vegetation extent by vegetation type retention status against the 10% and 30% thresholds, wetlands mapping or ecological linkages)	• Easy interpretation and use by stakeholders • Can be used to inform the implementation of specific conservation targets	• Small number of ecological criteria are represented spatially and thus considered in local biodiversity planning • Specific ecological values considered in isolation • Areas with multiple ecological values are not visually identified	• To catalogue the ecological values data (e.g. in the appendices of a local biodiversity strategy) • To inform the development of a bushland protection map (see section 4 of this document) • In local planning policies for consideration of a specific ecological value (e.g. ecological linkages)
Spatial representation of the results of multicriteria analysis – count of ecological criteria met, where all criteria considered are of equal importance (Figure 5)	• Easy identification of areas with multiple ecological values • When viewed via a mapping portal, listing of specific ecological criteria that contribute to the count at any location is feasible • Specific ecological values are viewed in relation to other ecological values	• Limited use if only available in a static, printed map format • There is a risk that areas with a low count of ecological criteria will be misinterpreted as being of low conservation value • The count numbers alone cannot be used to assign conservation significance (see section 3.3 of this document)	• To identify priority areas for further consideration of environmental values (e.g. areas where land use changes will be subject to environmental assessments or where conservation actions might benefit multiple ecological values) • To inform the development of a bushland protection map (see section 4 of this document)
Spatial representation of the results of multicriteria analysis – weighted criteria (e.g. threatened species and communities are assigned higher weighting score than other ecological criteria). Requires testing of the weighting scores assigned to the individual ecological criteria to generate a layer with meaningful	• As above, with the additional benefit of highlighting areas with ecological values assigned higher importance	• Limited use if only available in a static, printed map format • Testing of the weighting can be time consuming and might result in the same outcome as a simple count of ecological criteria used • There is a risk that areas showing low weighting score will be misinterpreted as being of low conservation value	• To identify priority areas for further consideration of environmental values (e.g. areas where land use changes will be subject to environmental assessments or where conservation actions might benefit multiple ecological values) • To inform the development of a bushland protection

separation of the weighted values		• The weighting numbers alone cannot be used to assign conservation significance	map (see section 4 of this document)
Spatial representation of ecological criteria categorised into subgroupings with assigned priority (e.g. Shire of Mundaring's Conservation Priority (P1-P3) mapping or the priority categories used in the Geraldton Local Biodiversity Strategy (2013))	• Easy identification of areas with assigned priorities (e.g. areas of regional and local significance) • Easy to understand communication tool	• The static map of priority categories does not identify which ecological criteria or how many ecological values might be present at a site • Cross referencing of multiple datasets is needed to identify ecological values present	• To identify priority areas for further consideration (e.g. areas where land use changes will be subject to environmental assessments) • To inform the development of a bushland protection map (see section 4 of this document)

It is important to understand what the mapping data represents to avoid misinterpretation of the results of any multicriteria analysis (see sections 3.3 and 6 of this document). Figure 5 is an example of a simple count of the number of ecological criteria as represented by available datasets in the mapped natural areas at the time of the analysis. In this example, 32 ecological criteria were applied to native vegetation extent and wetlands mapping in the Perth and Peel regions. All criteria were treated as being of equal importance.

This type of prioritisation mapping helps with quick identification of natural areas with multiple ecological values and thus potentially being of high conservation value. However, natural areas with lower count of ecological criteria cannot necessarily be considered as being of low conservation value. The ecological criteria count can be low, but the ecological values of such natural areas can still be very high. For example, a natural area with a low count of ecological criteria might contain one of the last remaining populations of threatened flora.

Another reason for lower count of ecological criteria can be poor data availability due to limited surveys or mapping being conducted in parts of the South West of Western Australia.

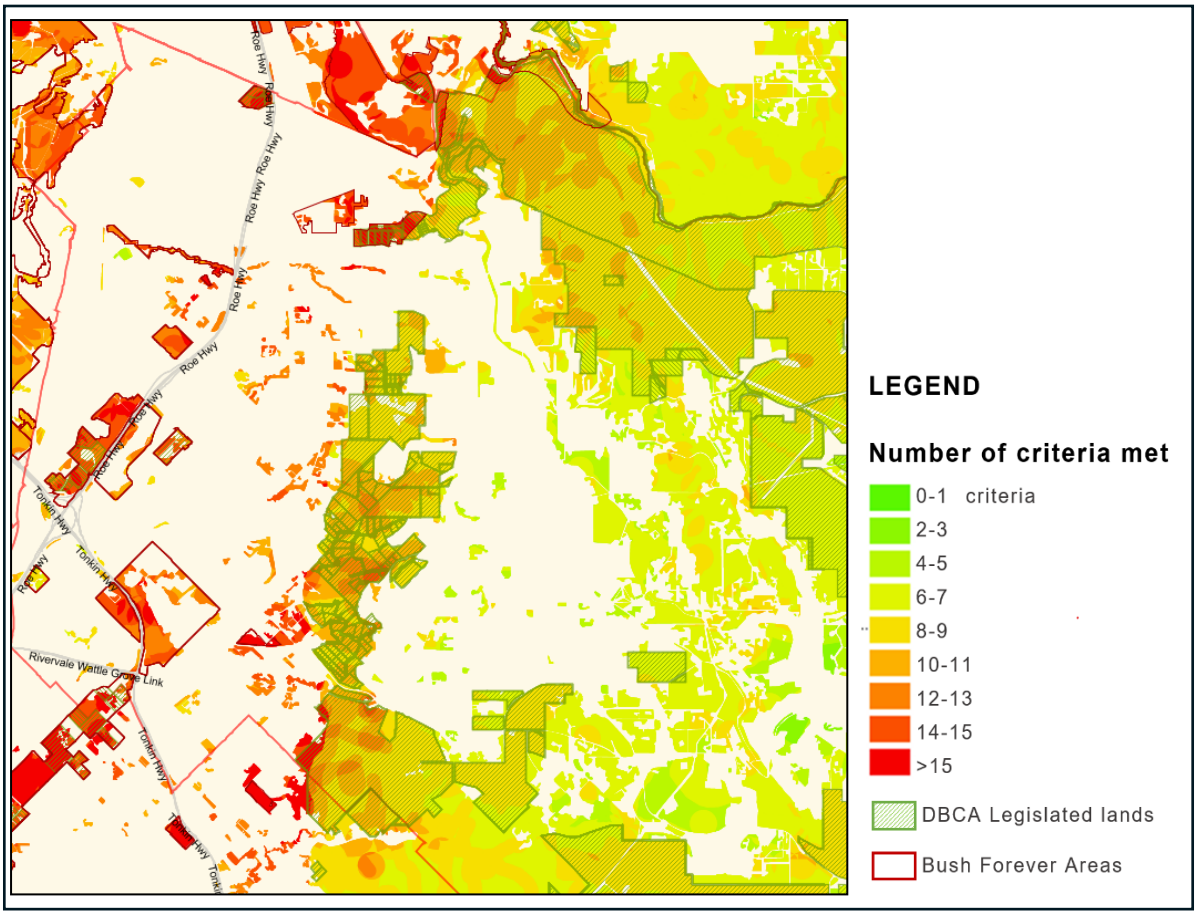


Figure 5: An example of the application of ecological criteria in the Perth Metropolitan Region with an overlay of Bush Forever Areas and lands managed by DBCA (WALGA, 2018)

Decisions informed by the mapping of the ecological criteria need to be supported by site inspections. Field surveys are needed to confirm the presence and condition of inferred biodiversity values and address the limitations or gaps in the available datasets.

The mapping data supporting prioritisation represents a snapshot in time, and the assessment of diversity and rarity relies on known survey records. Thus, the absence of threatened species or communities' records does not necessarily represent the absence of those values at a specific location but rather can be indicative of survey efforts at any locality. Similarly, there are gaps in wetland mapping across the South West of Western Australia, with wetland mapping available only for parts of a Local Government area.

Datasets are periodically updated and new datasets are released by various agencies or research organisations. More data relevant to local biodiversity planning might be available via regional NRM groups.

Use of ecological criteria in Local Government operations

1. Checklist of environmental considerations for Local Government infrastructure projects, facilitating timely avoidance and mitigation of potential impacts in project design. Early consideration of environmental matters in project planning supports timely environmental approvals for projects such as road upgrades and carpark or bike trail installations
2. Create a mapping layer showing the distribution of biodiversity that represents known records for multiple values across natural areas to support strategic and statutory land use planning
3. Prioritise resources for the management of lands vested in Local Government (these criteria overlap with the Natural Area Initial Assessment Templates – see section 6.2).

3.2 Identification of ecological linkages

The effectiveness of conservation reserves increases significantly when they are part of an interconnected ecological network (IUCN World Commission on Protected Areas, 2020). Landscape connectivity is needed to facilitate movement of species adapting to climate change by shifting their ranges.

Metrics of connectivity vary according to the conservation goals and the characteristics of a landscape. They range from species specific functional connectivity metrics to species-nonspecific structural connectivity metrics. The degree of habitat fragmentation and landscape modification are also important considerations when identifying ways of improving connectivity (Keeley *et al,* 2021). Where less than 30% of a given habitat's original extent remains, the spatial arrangement of the remaining habitat becomes critically important for maintaining biodiversity and preventing a rapid decline in the number of species (Figure 1) and a decline in the capacity to maintain ecological processes.

In the context of local biodiversity planning, ecological linkages are defined as contiguous and non-contiguous patches of natural areas that form stepping stones between larger natural areas, facilitating the movement of organisms within and across a landscape (Del Marco *et al,* 2004; Molloy *et al,* 2009).

To assist with the identification of ecological linkages, spatial modelling can be used to measure connectivity among remaining natural areas (Figures 6 and 7). A range of connectivity metrics can be applied to test scenarios of natural area distribution patterns and identify an optimal network of ecological linkages (Ecotones & Associates, 2024; O'Donnell, 2020; Local Biodiversity Program, 2014a; Oh, 2014; Shire of Northam, 2015; Wilkins, 2006).

Figure 6: Connectivity scenarios: Scenario 1 - Connectivity status based on 2013 native vegetation extent mapping; Scenario 2 - Connectivity metrics change in protected areas with remnant vegetation removed from lands not providing protection; Scenario 3 – Connectivity metrics in protected areas improve with retention of vegetation along ecological linkages (Local Biodiversity Program, 2014)

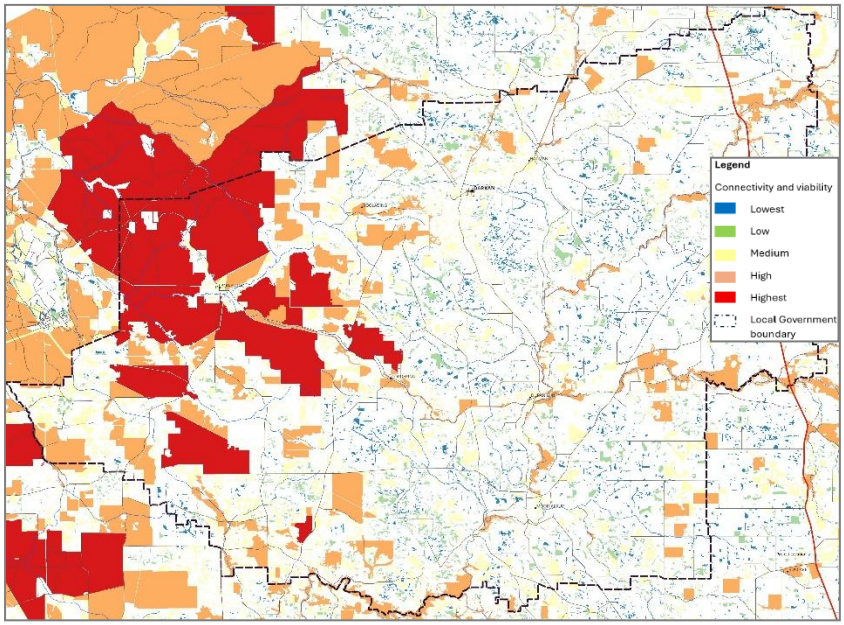


Figure 7: Connectivity viability analysis for the Shire of West Arthur Draft Local Biodiversity Strategy (Ecotone & Associates, 2024)

Ecological linkages or connectivity plans have been prepared for parts of the South West of Western Australia and are summarised in Table 3. It is important to understand the methodologies used to map the ecological linkages to avoid misinterpretation.

Table 3: Ecological linkages datasets for the South West of Western Australia

Dataset	Geographic coverage	Key features	Dataset availability
Perth Regional Ecological Linkages (Del Marco *et al,* 2004)	Metropolitan Region Scheme	Link between protected areas and the widest range of habitats of similar type that are typical of the Perth Metropolitan Region area. Manually mapped as 500 metre wide linkage lines	DataWA data.wa.gov.au
South Coast Macro Corridor Network (Wilkins *et al,* 2006)	South Coast NRM region	Identification of core ecosystems, buffers, transition zones and linkages between core ecosystems	Contact: DBCA GIS services
South West Regional Ecological Linkages (Molloy *et al,* 2009)	South West NRM region, including Peel and Greater Bunbury Region Schemes	Manually mapped axis lines between patches of remnant vegetation judged to be of regional significance and/or most contiguous patches available to act as stepping stones for flora and fauna between regionally significant areas	DataWA data.wa.gov.au
Chittering regional and local ecological linkages (Molloy, 2010)	Shire of Chittering	Based on principles of the Perth Regional Ecological Linkages	DataWA data.wa.gov.au
Geraldton regional and local ecological linkages (Guthrie, 2012)	Part of the City of Greater Geraldton and the Shire of Chapman Valley	Based on principles of the Perth Regional Ecological Linkages	Contact: City of Greater Geraldton
Wheatbelt NRM corridor plan (EcOz, 2013)	Wheatbelt NRM region	Framework for identifying corridors between 'functional vegetation' within mapped connectivity zones	Contact: Wheatbelt NRM
NatureLinks Perth (O'Donnell, 2020; Haddleton *et al*, 2022)	Metropolitan Region Scheme and Peel Region Scheme	Computer generated lines between protected areas using 'least cost path' method	Contact: NatureLinks Perth
Connectivity Potential for Australia (Version 1) (Australian Government, 2023)	South West of Western Australia	Computer generated lines between 'foundation areas', using 'least cost path' method applied to the National Vegetation Information System Version 4.1 and the National Carbon Accounting Forest Cover	Data.gov.au

Three ecological linkages datasets are available for consideration in the Perth Metropolitan and Peel Region Scheme areas. Understanding the differences between these datasets will inform their use at specific locations.

The Perth Regional Ecological Linkages (Del Marco *et al*, 2004) have been mapped to represent a link between protected natural areas and to incorporate the major variations in plant communities and fauna habitat typical of the Metropolitan Region area. The mapped linkages were selected to accommodate the widest range of flora and fauna and to connect habitats of similar type.

NatureLinks Perth (O'Donnell, 2020), the second linkages dataset covering the Perth and Peel Regions, focus on connections between protected areas without the consideration of the varied habitats within or between protected areas. However, they are based on more recent land use patterns and provide a useful resource for identifying alternative linkage routes in areas where land use changes affected the feasibility of the Perth Regional Ecological Linkages and identifying local ecological linkages.

Connectivity Potential for Australia (Version 1) (Australian Government, 2023) is the third dataset that covers the Perth Metropolitan area. It is based on 2018 vegetation mapping, which is older than NatureLinks, and does not consider the full range of habitats occurring in Perth.

Identification of ecological linkages is an integral part of the local biodiversity planning process. Appendix 4 describes the general principles for identifying local ecological linkages, which can be used to identify ecological linkages where mapping is not available.

3.3 Understanding data limitations

It is important to understand how datasets used in local biodiversity planning were created, what they represent and their limitations.

Assessment of natural areas against ecological criteria involves intersecting datasets representing the various components of biodiversity. One of the main datasets, native vegetation extent mapping, is based on expert interpretation of aerial photography and manual drawing of polygons representing native vegetation. The interpretations are not validated in the field and mapped vegetation can include areas of non-native vegetation or completely degraded vegetation.

Further limitations of this dataset are due to the varied age of imagery and varied scale of capture used within the dataset. The native vegetation extent mapping released in 2021 (DPIRD, 2021), mapping around Perth, Peel, Bunbury, Geraldton and parts of the City of Busselton, is based on aerial photography captured in 2020. In other parts of the State, this mapping is based on older aerial photography; in some areas more than 15 years old.

In areas where the latest vegetation extent mapping is not based on current aerial photography, the mapping layer can be updated using the most up to date aerial imagery covering a Local Government area. Current aerial imagery can be sourced via the State's CaptureWA program or via alternative online sources of satellite imagery.

Another consideration is the mapping scale at which mapped attributes are captured. Within the native vegetation extent mapping (DPIRD, 2021), the capture scale varied from 1:5,000 in some parts of the State to 1:20,000 in others. Therefore, some small reserves managed by Local Government might not be captured in the Statewide vegetation extent dataset.

Missing Local Government managed natural areas can be added to improve the native vegetation extent baseline layer for the local biodiversity planning process. Local knowledge can be used to update the Statewide vegetation extent mapping by including any missing natural areas that are known to be in good or better condition, and by removing natural areas cleared since the year of the mapping or those approved to be cleared. It is critical that any amendments to the baseline datasets, such as the Statewide native vegetation extent mapping, are documented for transparency and monitoring purposes.

The scale of vegetation type mapping used in local biodiversity planning to describe ecological communities is larger than the native vegetation extent mapping. The most used vegetation type mapping data were captured at 1:50,000 for the vegetation complexes of the South West Forest region and 1:250,000 for the Swan Coastal Plain vegetation complexes and the Statewide mapping of vegetation associations. These datasets were not designed to inform at finer scale. Therefore, in combination with the native vegetation extent mapping in cleared areas, it should not be assumed that the fragmented remnants will be representative of the mapped vegetation type.

Due to these limitations, vegetation statistics based on the native vegetation extent mapping and vegetation type mapping are indicative only (Government of Western Australia, 2019a; Government of Western Australia, 2019b).

Datasets containing records of threatened and priority species and ecological communities reflect survey efforts and are not a comprehensive representation of the threatened species and communities in a specified area (Government of Western Australia, 2025). Absence of species records in areas that retain native vegetation cannot be interpreted as species not present. Field assessments are required to assess the vegetation habitat values and condition.

As noted in section 3.2, the mapping of ecological linkages differs in scope and mapping techniques used. Understanding the limitations of the ecological linkages mapping approaches is critical to their appropriate use in decision making.

Despite the limitations, using these datasets is valuable as they help identify areas of known ecological values, establish local retention status and identify data gaps. Many datasets are periodically updated with new records and can be used to update the LNA prioritisation mapping.

3.4 Assessing the opportunities and constraints to retention and protection of LNAs

Several factors are considered when identifying opportunities to retain and protect natural areas with high biodiversity values. These factors can be divided into two main types:

1. Threatening processes and the interactions across them
2. The land tenure and current land use provisions.

To help with identifying opportunities and constraints to native vegetation retention and protection across LNAs, the following mapping information can be used:

- Existing and proposed land uses (region scheme and local planning scheme zones and reserves, Crown reserves by purpose and responsible management authority)
- Significant biodiversity areas identified via regional processes such as Swan Bioplan (Government of Western Australia, 2014) or conservation planning undertaken by regional NRM groups
- Properties under varied covenanting programs.

A review of all structure plans can help to find opportunities for improving LNA retention through alternative structure plan design and amendments to local planning scheme provisions.

Understanding the local planning scheme provisions for native vegetation and biodiversity is critical to effective local biodiversity planning. While local planning schemes often include objectives and requirements for retention of significant native vegetation, these provisions can be of limited application when ‘significant’ vegetation is not defined. Local biodiversity strategies with a bushland protection map help with defining ‘significant’ vegetation within a Local Government area (see section 4 of this document for further information).

It is useful to quantify the distribution of remnant vegetation by vegetation type across various land uses and portions of lands reserved for various purposes. It is also useful to identify all Crown lands managed by Local Government, listing their purpose, size, area of native vegetation by

vegetation type and any known biodiversity values. This desktop analysis of Local Government managed LNAs is used to prioritise surveys to confirm the status and condition of the ecological values present on the ground, informing resourcing for management and identifying offset potential within these lands.

In local biodiversity planning, consideration of threatening processes (e.g. the impacts of climate change) includes the listing of locally relevant key threatening processes and the mapping of ecological linkages as a way of responding to habitat loss and fragmentation. Mapping of threatening processes is often limited to Local Government managed lands, including road reserves. It can include dieback, weeds, salinity, ecosystems susceptible to hydrological changes or fire sensitive ecosystems.

4. Protection and Action Plan

4.1 Bushland protection map

The final mapping analysis undertaken in the local biodiversity planning process is the creation of a bushland protection map, or a spatial plan, which identifies where local conservation objectives can be achieved and what instruments will be used to achieve these objectives. Four types of bushland protection maps were developed by Local Governments in the South West of Western Australia, summarised in Table 4.

Table 4: Examples of bushland protection maps used in local biodiversity strategies in the South West of Western Australia

Map type	Description	Examples
Categorisation of all LNAs by proposed protection levels or by proposed type of conservation action (Figure 8)	Based on the prioritisation of LNAs using the ecological criteria and the assessment of opportunities for retention and protection considering the current land use provisions, tenure and existing development rights. All LNAs are assigned into categories, for example: • Conservation (formalised protection) • Protection (via local planning strategy and scheme) • Retention (via local planning scheme) • To be negotiated (LNAs subject to current planning processes) • Committed by Zoning (LNAs with existing development approvals)	Shire of Mundaring, 2009 and 2023 City of Swan, 2016 City of Canning, 2018 City of Kalamunda, 2023
Categorisation of all LNAs by protection target contributions towards adopted conservation targets for a biodiversity component (e.g. vegetation complexes)	Based on representation of vegetation complexes within LNAs and the assessment of opportunities for increased protection considering the current land use provisions, tenure and existing development rights. All LNAs are assigned into one of three categories: • 0% protection • Partial protection (3-10%) • 100% protection expected	City of Wanneroo, 2011
Mapping of Areas of Conservation Values (ACVs) where opportunities exist to contribute towards adopted conservation	Based on representation of biodiversity components, such as vegetation types, within LNAs. These ACVs are represented as overlay polygons over LNA mapping. They can be categorised by type of conservation action (protection or retention) and in some instances,	Shire of Chittering, 2010 and 2022 City of Greater Geraldton, 2013

targets for a biodiversity component (e.g. significant vegetation types) (Figures 9 and 10)	they have unique identification codes linked to additional information in the local biodiversity strategy. For each ACV, information is provided about the type of biodiversity to target, how much should be protected or retained and through what mechanism, considering the current land use provisions, tenure and existing development rights (see section 6 of this document).	Shire of Northam, 2015
Biodiversity Planning Precincts (Figure 11)	Biodiversity Planning Precincts divide the Local Government area into precincts that reflect the current land use zoning and reservations, grouping land uses according to opportunities they provide for biodiversity protection or retention. Conservation targets in the form of LNA area in hectares are allocated to each Biodiversity Planning Precinct, focusing on high conservation value LNAs within each precinct.	City of Armadale, 2009 City of Mandurah, 2013 Shire of Murray, 2013 City of Kwinana, 2022

Categorisation of all LNAs by conservation objectives (protection and retention) and the mapping of ACVs have shown to be an effective way of integrating local biodiversity objectives into the local land use planning framework. As distinct mapping layers, they can be identified in a local planning strategy or local planning policies.

Development of a bushland protection map was not in the scope of the local biodiversity planning process described in the first Local Biodiversity Planning Guidelines (Del Marco *et al*, 2004; Molloy *et al*, 2006). However, their development is recommended in SPP 2.8 (WAPC, 2010), which recognises the contribution of local bushland to regional conservation.

The format of a bushland protection map is not prescribed. The purpose of the map is transparency; to show areas of high conservation value biodiversity that need to be considered in land use planning and to show areas that were identified as having good opportunities for increased biodiversity protection, supporting the achievement of local biodiversity strategy objectives and targets.

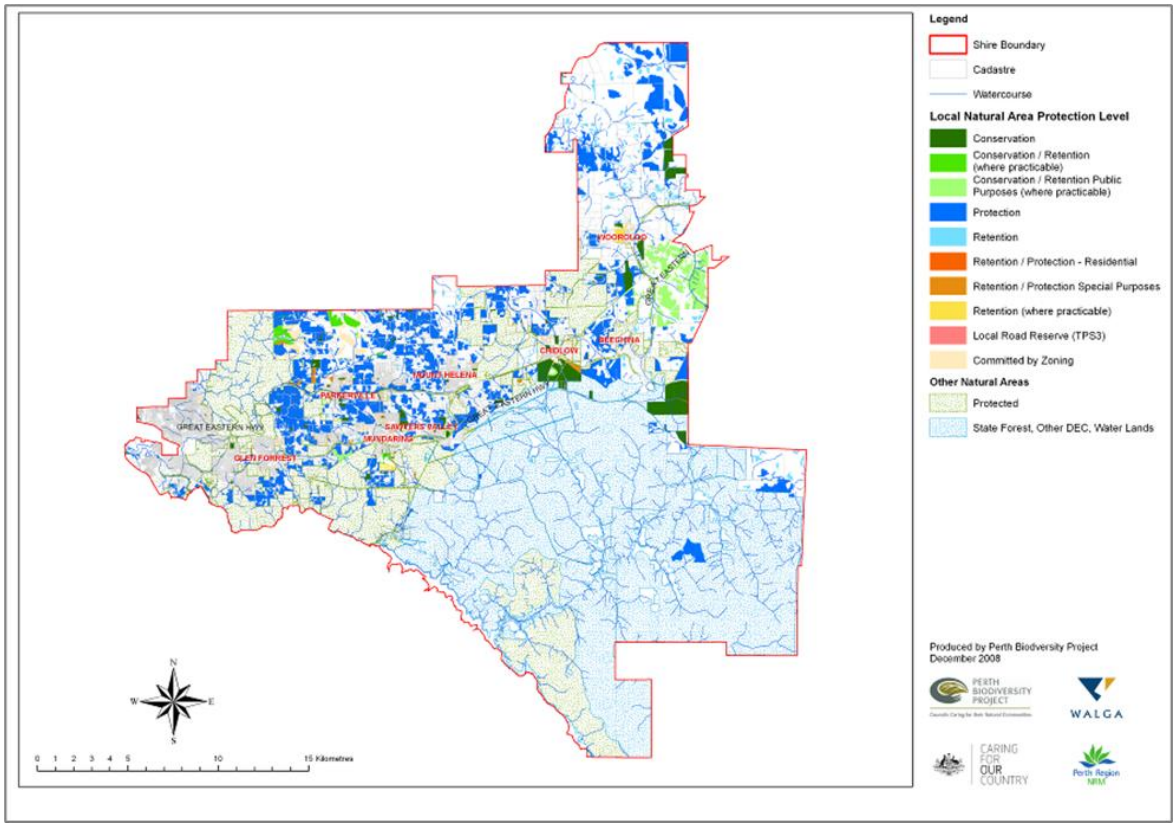


Figure 8: Example of a bushland protection map where all LNAs are categorised by proposed protection level (Shire of Mundaring, 2009)

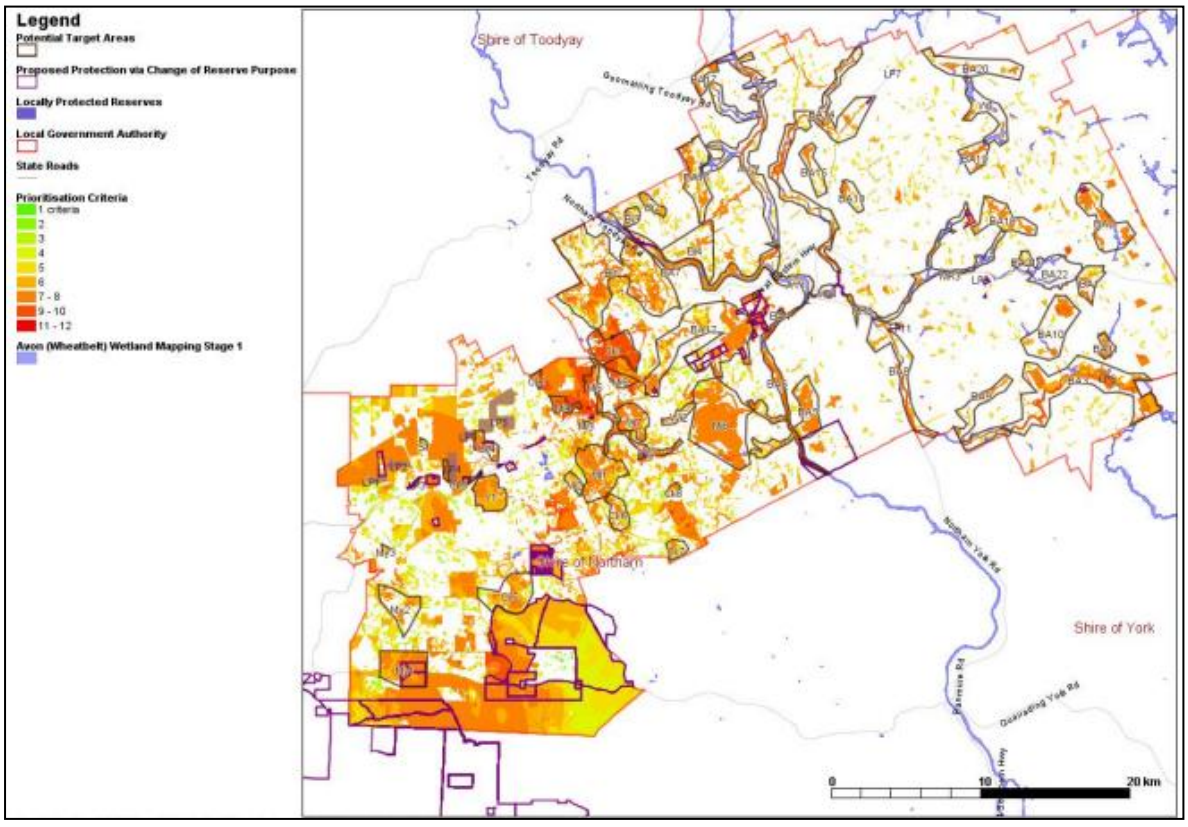


Figure 9: Example of a bushland protection map with an overlay of potential target areas over prioritised LNAs (Shire of Northam, 2015)

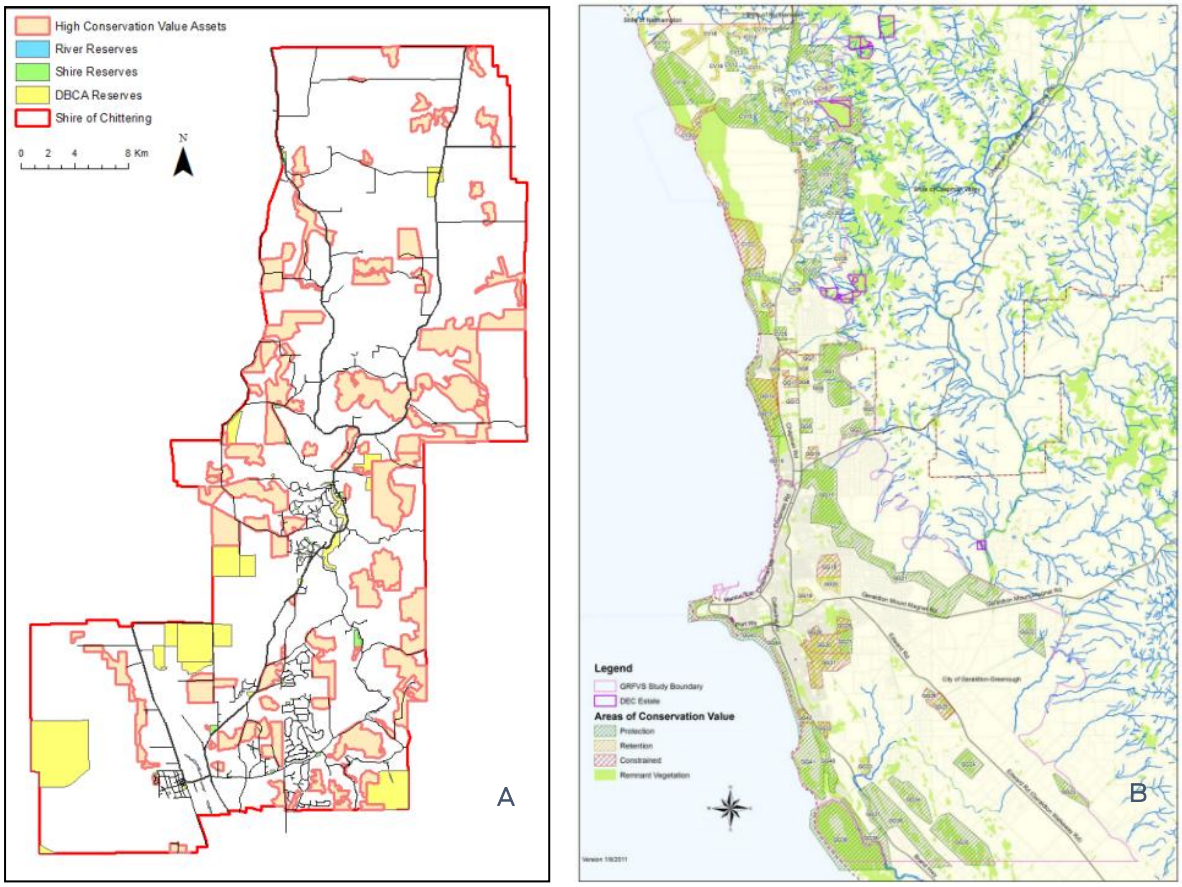


Figure 10: Two examples of the mapping of ACVs: A) High Conservation Value Assets including target areas for significant vegetation and reserves (Shire of Chittering, 2022) B) Areas of Conservation Values categorised by proposed outcome (protection or retention) and identifying LNAs affected by existing development rights (City of Greater Geraldton, 2013)

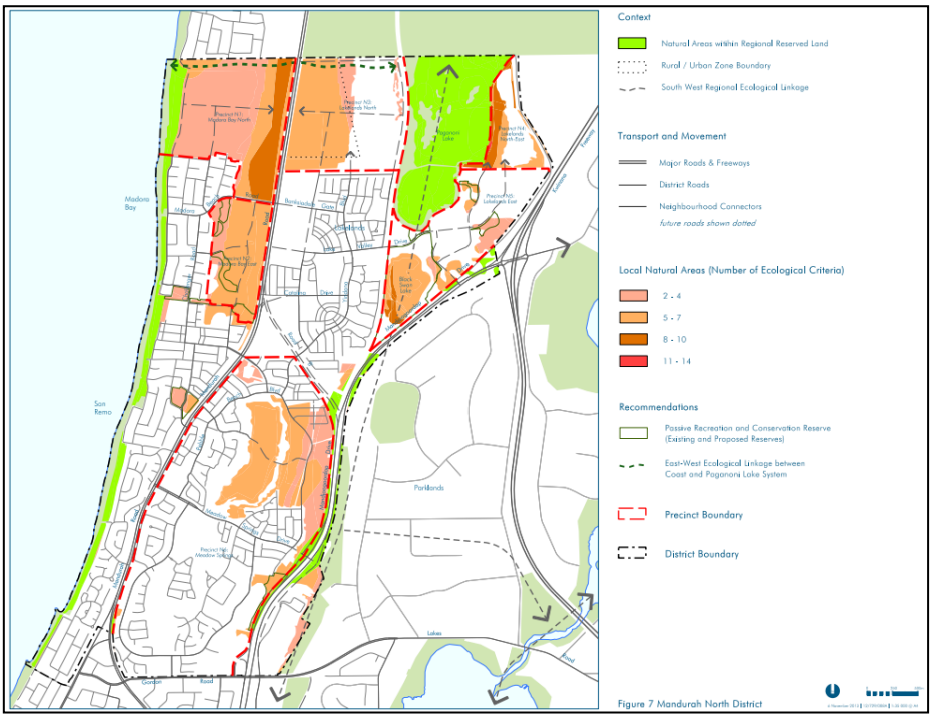


Figure 11: Example of the use of Biodiversity Planning Precincts over prioritised LNAs (City of Mandurah, 2013)

4.2 Action Plan

A Local Biodiversity Strategy Action Plan should outline the responsibilities assigned across the organisation and cover a five to ten year period. The Action Plan may include:

- An explanation of how biodiversity considerations are being incorporated into the local planning strategy, scheme and policies
- Any changes to the vesting purpose of priority reserves
- Actions for land managed by the Local Government, including reserves, public open space, freehold land or road reserves
- A checklist of biodiversity matters to be considered prior to planning projects on these types of land
- A code of conduct or operational procedure that specifies how work by third parties or contractors needs to be delivered in the Local Government
- An explanation of how the community will be engaged to raise awareness and support volunteers in local reserve management.

4.3 Integration into Local Government operations

Each Local Government is required to prepare a Strategic Community Plan that informs the Local Government's Corporate Business Plan. Strategic Community Plans are developed with significant community input, reflecting local community aspirations, and are endorsed by the Council.

A local biodiversity strategy, as one of the issue specific strategic plans sitting under the Strategic Community Plan, should guide service delivery within the areas of the Local Government's control and influence (Figure 12).

Local Governments have varying degrees of influence over how some land uses and tenure arrangements impact biodiversity within the Local Government area. However, opportunities to identify ways of influencing land uses and tenure arrangements through advocacy, education and support for private landholders and through cooperation with key stakeholders should be considered when preparing the Local Biodiversity Strategy Action Plan.

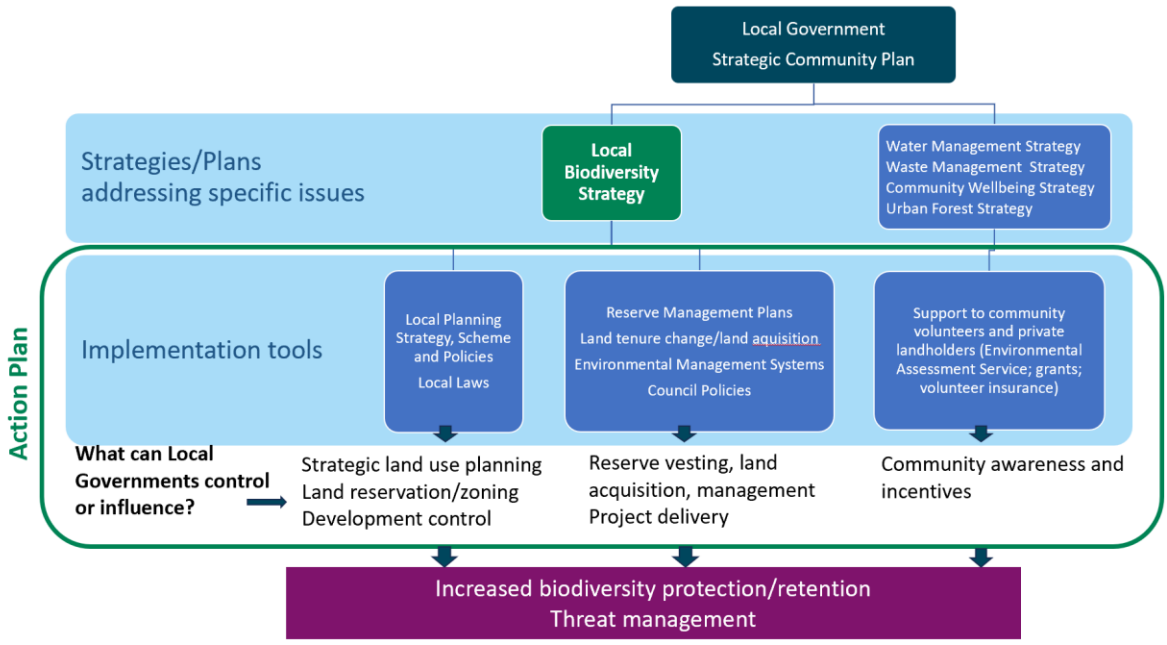


Figure 12: Integration of biodiversity considerations into Local Government operations

The size, complexity of land uses and tenure arrangements influence the type of actions Local Governments use when implementing local biodiversity strategies. While land acquisitions or delivering incentives for private land conservation might not be an option for many Local Governments, all Local Governments in the South West of Western Australia prepare local planning strategies and schemes and deliver projects, such as road upgrades. Early and adequate consideration of biodiversity into land use planning and infrastructure project design leads to significant improvements to local biodiversity status. Resourcing options for the management of biodiversity on lands vested in Local Government are also considered.

5. Consultation

It is important to ensure the objectives and actions of the local biodiversity strategy are supported by the community. Extensive public consultation will further support Council in their consideration of the final local biodiversity strategy.

Council support should be obtained to release the draft local biodiversity strategy for public comment. The local biodiversity strategy development team should review the feedback received and make changes to the draft if is required. Council support should be sought in adopting the final Local Biodiversity Strategy Action Plan.

6. Implementation and review

6.1 Increasing the protection of locally significant natural areas

One of the key objectives of local biodiversity planning is to identify ways to increase the long-term protection of high biodiversity value LNAs. There are four measures that can be used by Local Government to increase the protection of LNAs:

1. Local planning scheme provisions
2. Change of the vesting purpose for Crown lands reserved under the *Land Administration Act 1997*
3. Covenanting (by covenanting agency) as condition of land use change approval
4. Land acquisition.

6.1.1 Integrating biodiversity consideration into land use planning

The majority of development in Western Australia is regulated via the provisions of the local planning instruments. Created by Local Governments, the local planning instruments are considered by all decision makers. Local planning instruments include local planning strategies, local planning schemes, scheme amendments, local planning policies, structure plans, local development plans, development contribution plans and others. These instruments must align with State Government policies and region schemes, however, deviations are allowed where there is strong justification.

There are opportunities at each stage of the land use planning process to consider biodiversity and local biodiversity conservation objectives. The best opportunities are in the early stages of land use planning (Figure 13).

Local planning strategies give strategic direction for land use in the Local Government area and provide the best opportunity for biodiversity considerations. Mapping of prioritised natural areas, the bushland protection map and the local objectives for biodiversity can be integrated into the local planning strategy. Local planning strategies give justifications for the types of zones and local reserves in the local planning scheme, outlining any specific provisions needed to achieve the local biodiversity conservation objectives (WAPC, 2023).

Local planning schemes are the principal statutory instrument for achieving a Local Government's objectives with respect of development of its local area. Local planning schemes allocate privately owned lands into zones and public lands as reserves. Several types of zones used by Local Governments include objectives that seek the retention and protection of natural areas. Local reserve classification as 'Environmental Conservation' can be used to differentiate between public open space areas used for active recreation and those that retain significant biodiversity while providing for passive recreation (Figure 14).

Local planning policies (LPPs) provide a tool for clarifying Local Government objectives for certain types of development and may set out matters that need to be addressed when development applications area made. LPPs help to clarify how Local Government will use its discretion under the provisions of the local planning scheme. While LPPs are not statutory documents, when used consistently, they can have a weight of law. A critical feature of an effective LPP is that it must be consistent with the local planning scheme.

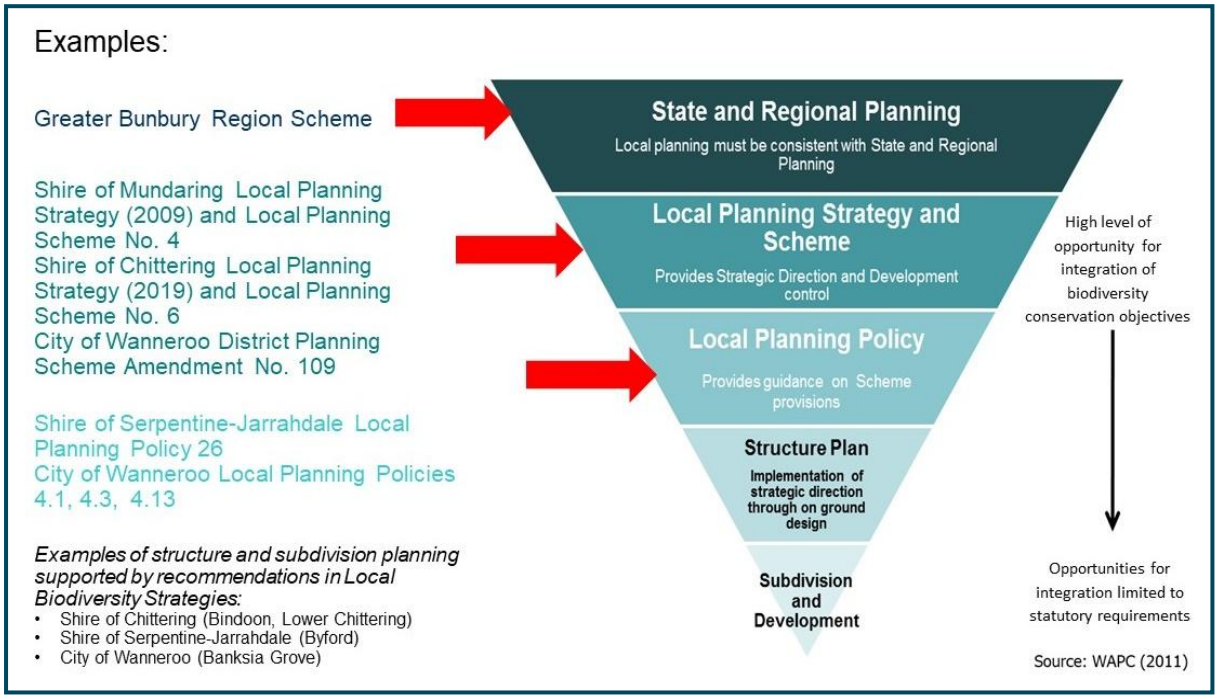


Figure 13: Regional and local planning instruments

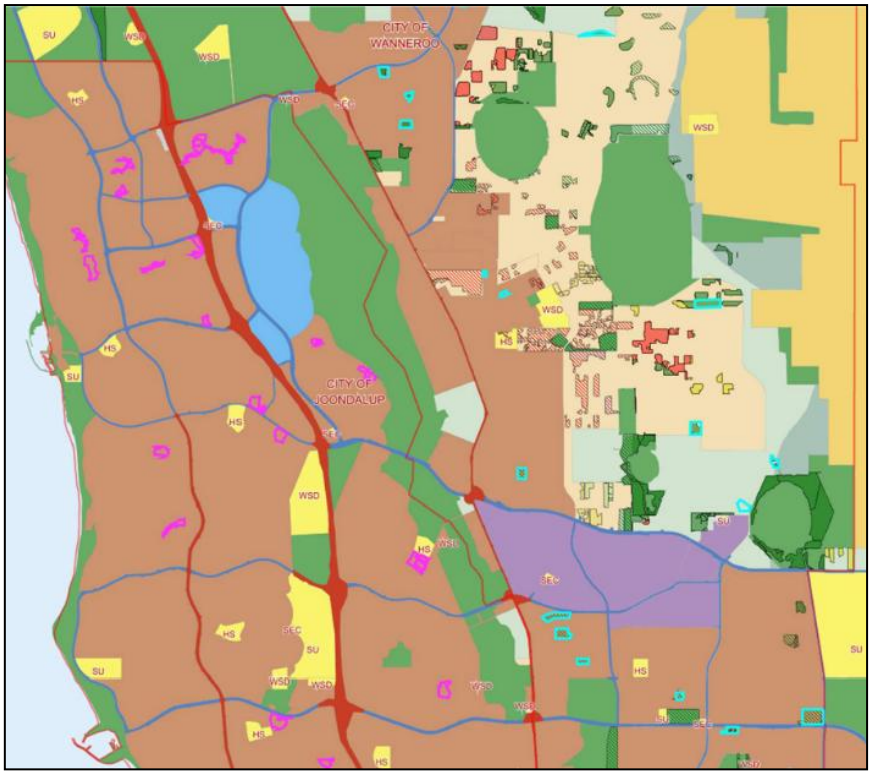


Figure 14: Local conservation type reserves (magenta and aqua boundaries) over Metropolitan Region Scheme zoning (urban and rural).

Source: WALGA (2021b)

Strong provisions for natural area retention of special protective zones, supported by relevant local planning policies, can be used to refuse development applications that would involve clearing of native vegetation or have other impacts on biodiversity. Appeals on such decisions are less likely to be successful, with local planning instruments facilitating long-term protection of biodiversity in priority areas.

6.1.2 Change of the vesting purpose for Crown lands

One way to formalise the protection of high conservation value LNAs is by changing the vesting purpose reserves where the Local Government is listed as the management authority. Public reserves (Crown lands) are classified under the *Land Administration Act 1997*. The vesting purpose of most Local Government managed reserves includes recreation and other public use purposes but also include gravel.

The local biodiversity planning process facilitates the identification of potential biodiversity values in all Local Government managed reserves. Using the ecological criteria described in this document (see section 3.1), these reserves can be prioritised for field surveys to confirm the condition of the biodiversity values. Those in good or better condition, and that are representative of biodiversity components with specific conservation targets identified in the local biodiversity strategy, can be protected by changing or extending the current vesting purpose of the reserve to include conservation.

This method of increasing the protection status of reserves declared under the *Land Administration Act 1997* will contribute to meeting local biodiversity conservation targets and objectives and can also be used to meet environmental offset requirements for local infrastructure projects. Having information on potential offset values within Local Government managed reserves helps with timely environmental approvals.

It is recommended that Crown reserves with conservation vesting purpose are also recognised in the local planning scheme and classified as 'Environmental Conservation' instead of recreation or public use. Information on the vesting purpose of Crown reserves is not publicly available information, thus recognition of these reserves in the local planning scheme land use classification raises community awareness and demonstrates commitment to the community's strategic objectives for the local environment.

6.1.3 Covenanting

Covenants are legally binding agreements between the landowner and a covenanting organisation. Covenants are registered on the title of the land and bind current and future landowners. Conservation covenants protect biodiversity by controlling the land uses.

In Western Australia, conservation covenants are established under the following Acts:

- *Soil and Land Conservation Act 1945* - under a program run by the Soil Commissioner and the Department of Primary Industries and Regional Development (DPIRD)
- *National Trust of Australia (WA) Act 1964* - facilitated by the National Trust
- *Transfer of Land Act 1893* - run by DBCA as Nature Conservation Covenants
- *Environmental Protection Act 1986* - new Act provisions introduced in 2020.

While Local Governments can become a covenanting agency under the *Transfer of Land Act 1893*, due to resourcing requirements to manage such initiatives, this is not a viable option.

Conservation covenants can be made a requirement of subdivision approval under a local planning scheme provision. This option is best suited for Local Governments outside the Region Scheme areas, with a very small number of properties in these areas being accepted by the covenanting agencies. This is mostly due to the smaller size and the surrounding land uses.

Figure 15: Possum Rope Bridge built to support Western Ringtail Possum movement through habitat retained within a residential subdivision in the City of Mandurah.

Photo credit: WALGA

6.1.4 Land acquisition

Local Governments manage significant land assets, including freehold land, for various purposes. Surplus funds sourced from the sale of lands can be used to purchase new lands, for example, to meet public open space needs in specific areas, to purchase lands for conservation or to meet environmental offset obligations.

The City of Mandurah used land acquisition as one of the actions towards meeting their local biodiversity conservation objective for increased protection. Through its targeted program, the City met its acquisition target in 2022 and improved biodiversity conservation outcomes in the targeted areas. One of the land acquisitions resulted in a conservation reserve being established by combining land secured through conditions on subdivision approvals and the acquisition of an adjoining land parcel, increasing the size of the reserved natural area compared to the sizes of reserve secured through subdivision processes only.

Alongside land acquisition, the City of Mandurah also implemented novel approaches to support wildlife protection. To protect verified habitat of the Critically Endangered Western Ringtail Possum, the City built a Possum Rope Bridge in Dawesville with the aims of reconnecting habitat and reducing the risk of injury from roads and predators (Figure 15).

6.2 Natural area management

6.2.1 Reserve management

Ecological assessments of bushland reserves can be undertaken using the Natural Area Initial Assessment (NAIA) templates. These facilitate the gathering of site-specific information on ecological values, conservation significance and threatening processes in reserves and other lands managed by Local Government. This information can be used to calculate a score for a natural area, which is then used to rank and prioritise natural areas for protection and management. Assessment and monitoring of natural areas is essential to best allocate resources and measure the effectiveness of implemented management actions.

When considering natural area management priorities, there are two guiding principles:

1. Biodiversity is best conserved in-situ; thus retention, long-term protection via secure land tenure and management of threats are of highest priority
2. Regeneration is a higher priority than revegetation.

Bushland restoration refers to the return of a vegetation community to its close pre-disturbance state. This can be achieved through assisted natural regeneration or revegetating degraded areas by supplementary planting or direct seeding.

Natural regeneration should be assisted by weed management, erosion control and minimising disturbance by managing access and use (e.g. fencing, designated use areas, bollards and signage). The Bradley method of bushland regeneration is widely used and involves three main principles:

1. Secure the best areas first: Focus on protecting areas of the best condition vegetation first. These core areas can then be expanded by restoration of areas of decreasing vegetation condition
2. Minimise disturbance: Minimise soil disturbance and off-target damage
3. Don't over clear when removing weeds: Let the restoration of bushland set the pace for the removal of weeds. Native plants need to regenerate and form a dense and healthy coverage to successfully compete with weeds.

Revegetation should only be undertaken in degraded areas and using local provenance[3] species from the same vegetation community that would have been present before clearing. Local provenance seed should also be collected where possible to ensure the retention of variation in the local gene pool, which assists an ecosystem's ability to adapt to changing environmental conditions. The 'local' seed collection zone varies for different species depending on their mode of pollination and seed dispersal. For example, research on genetic differentiation between populations of Firewood Banksia (*Banskia menziesii*) supports a 30 km radius seed collection zone. Where species specific information is not available, DBCA use a 15 km radius as a general guideline.

[3] Local provenance refers to seed collected from natural populations growing in the same vegetation community and position in the landscape within a reasonable (closest possible) distance of the area being restored.

In planning for restoration and revegetation works, collect relevant information about the site to assist with identifying the appropriate species to plant. The NAIA Templates can be used as a tool to collect baseline information, such as the structural plant communities and icon species present, and their correlating soils, drainage characteristics, topographic position, growth form layers, dominant species and crown cover. Where site conditions are not adequate for generating lists of species for revegetation projects, alternative information sources can be used, such as:

- Reference sites containing information on typical plant communities found in the Perth Metropolitan Region (40 sites covering the Swan Coastal Plain and 11 sites covering the Jarrah Forest portion of the metropolitan area). Reference site information is available via data.wa.gov.au
- Flora and vegetation mapping reports from nearby areas. Some mapping reports can be found via State Government's Index of Biodiversity Surveys for Assessment (IBSA) – an online depository of biological surveys in WA
- Regional NRM group websites. For example, Wheatbelt NRM's online tool for Wheatbelt woodlands survey or the downloadable *Benchmarking Wheatbelt Vegetation* (Harvey and Keighery, 2012)
- Nurseries specialising in Western Australian native flora can provide advice on appropriate species selection. For example, APACE Nursery in the Perth metropolitan area has an online Suburb Selector tool to assist with suitable plant lists.
- Landcare groups. Some of these manage their own nurseries, for example, Katanning Landcare.

It is important that Local Government staff involved in natural area management build up their expertise and the required skills to effectively manage natural areas.

6.2.2 Roadside vegetation

Local Governments are responsible for 127,978 km of local roads, representing 86.6% of Western Australia's road network (WALGA, 2025). As well as providing safe and efficient road networks, it is important to minimise the impacts of road construction and maintenance works on the biodiversity values that exist in road reserves.

Some local road reserves contain native vegetation of very high biodiversity conservation value, representing some of the last remaining examples of ecological communities in highly cleared landscapes and supporting the movement of wildlife between patches of remnant vegetation. Over 50% of threatened flora in Western Australia has a population on a roadside.

Good quality roadside vegetation provides a number of benefits, including acting as a windbreak, erosion control and shelter for stock. Vegetated roadsides are valued by local communities for the sense of place they provide and cultural values. Some areas have become popular tourist destinations because of their wildflower displays and their scenic or 'back-road' experiences, which also supports the local economy.

Native vegetation extent mapping used in local biodiversity planning (see section 3.1) does not capture all native vegetation due to the scale of capture used. Narrow strips of roadside vegetation are often missing from the mapping layer. However, the ecological criteria used in local biodiversity planning can be used as a checklist of environmental matters to consider when planning road upgrades and road maintenance works. Early identification of biodiversity matters to consider in project design helps to identify priority areas for avoidance, impact minimisation options and potential offset needs. The offset needs can be considered in the context of the local biodiversity strategy objectives, which might include priority areas for restoration. Early consideration of these matters is necessary for any required native vegetation clearing permits or referrals and facilitates timely assessment to support project delivery.

Figure 16: Ruabon Road and Tutunup Road Corridor is the longest of the last three intact transects across the Swan Coastal Plain, retaining two threatened ecological communities. One of these is the largest remaining patch of the Busselton Ironstone threatened ecological community, supporting 389 native species (of which 14 are threatened flora and 13 are priority flora) and providing habitat to five threatened fauna and one priority fauna (City of Busselton, 2019)

Policies or codes of practice help to ensure transparency and establish expectations of how works are to be undertaken within road reserves, whether by Local Government staff, contractors or third parties seeking to undertake clearing within a local road reserve. Third parties are required to seek approval to undertake works on lands vested in Local Government which provides an opportunity to check for presence of Environmentally Sensitive Areas, and advice about what is acceptable clearing.

A local biodiversity strategy can be used to raise awareness of the value of roadside vegetation and action the development of guidance documents to support best practice management by adjoining landowners and contractors working in Local Government managed road reserves.

6.3 Incentivising private land conservation and community engagement

Most LNAs in a Local Government area are on private lands. Support for landowners to actively manage the biodiversity on their lands is therefore an important consideration.

Support provided by Local Government to private landowners ranges significantly and includes:

- Annual plants provided to residents through a subsidy program to encourage use of local native plants in residential and rural areas
- Community grants for environmental activities on public and private lands, for example, supporting vegetation restoration along waterways to address water quality issues and address erosion
- Ecological assessments of bushland on private land and free management advice.

The Shire of Mundaring introduced an innovative Environmental Asset Inspection service for its residents. It aims to achieve a more balanced approach to bushfire risk mitigation by meeting with landowners and their bushfire consultants on-site before mitigation plans are prepared. This service was made possible by involving an Environmental Officer earlier in the development approval process and through the introduction of a modest service fee. In 2018-2019, this initiative has been recognised at the State and national levels as best practice and is well utilised by residents.

Local Governments may partner with regional NRM groups to deliver biodiversity outcomes. These organisations provide regional NRM planning, information, networks and delivery across Australia with the objective of creating a sustainable future for Australia's environment for current and future generations. There are seven regional NRM groups in Western Australia.

Community volunteers contribute significantly to the management of natural areas by volunteering time to remove weeds, collect seed, undertake revegetation and restoration works, facilitate awareness of the conservation values of LNAs and collect valuable data on local flora and fauna.

Community groups can attract significant funding to support their activities via Australian or State Government Landcare or Coastcare funding programs and thus contribute to the investment into LNA management. For example, the City of Canning calculated that for every $1 the City invested into supporting volunteers in natural area management in the 2020-21 financial year, $4.34 was returned in the value of implemented projects with grant funding delivered by volunteers.

Examples of community support provided by Local Government in Western Australia include:

- Volunteer's insurance
- Operational and technical support to volunteers by Local Government staff
- Adopt a Bushland school support program
- Friends Groups Manual
- Funding support for community environmental centres or Landcare groups, such as The Wetlands Centre at Bibra Lake, Landcare Serpentine-Jarrahdale or the Chittering Landcare Centre.

Working in partnership with a range of stakeholders is of significant benefit to all Local Governments. It also enables work towards local biodiversity conservation objectives by Local Governments with limited resources or no internal expertise to manage environmental projects.

6.4 Review

A local biodiversity strategy should be reviewed every five to ten years to allow for the adaption of prioritisation and implementation actions as needed.

References

Australian Government (2023) *Connectivity Potential for Australia (Version 1),* Department of Climate Change, Energy, the Environment and Water, Canberra. Dataset available via data.gov.au.

Beard, J.S., Beeston, G.R., Harvey, J.M., Hopkins, A.J.M. and Shepherd, D.P. (2013) *The vegetation of Western Australia at the 1:3,000,000 scale: explanatory memoir,* second edition, *Conservation Science Western Australia,* vol. 9: pp. 1-152.

City of Armadale (2009) *Local Biodiversity Strategy,* City of Armadale.

City of Canning (2018) *Local Biodiversity Strategy,* City of Canning.

City of Greater Geraldton (2013) *Local Biodiversity Strategy – Geraldton and Chapman Valley,* City of Greater Geraldton.

City of Kalamunda (2023) *Local Biodiversity Strategy 2023-2043 - Part 2: Technical Report,* City of Kalamunda.

City of Kwinana (2022) Local Biodiversity Strategy, City of Kwinana.

City of Mandurah (2013) *Mandurah Planning Strategy – Biodiversity Strategy,* City of Mandurah.

City of Wanneroo (2011) *Local Biodiversity Strategy 2011-2016,* City of Wanneroo.

Commonwealth of Australia (2010) *Australia's Strategy for the National Reserve System 2009-2030*, Australian Government, Canberra.

Commonwealth of Australia (2021) *Australia State of the Environment Report 2021*, Department of Agriculture, Water and the Environment, Canberra.

Commonwealth of Australia (2024) *Australia's Strategy for Nature 2024-2030*, Australian Government, Canberra.

Conservation and Parks Commission (2023) *Forest Management Plan 2024-2033*, Conservation and Parks Commission, Perth.

Conservation Commission of Western Australia (2013) *Forest Management Plan 2014-2023*, Conservation Commission of Western Australia, Perth.

Dasgupta, P. (2021) *The Economics of Biodiversity: The Dasgupta Review*, HM Treasury, London.

DCCEEW (2022) *Nature Positive Plan: better for the environment, better for business,* Department of Climate Change, Energy, the Environment and Water, Canberra, December. CC BY 4.0

DCCEEW (2022) *Threatened Species Strategy Action Plan 2022-2032*, Department of Climate Change, Energy, the Environment and Water, Canberra, September. CC BY 4.0.

Del Marco, A., Taylor, R., Clarke, K., Savage, K., Cullity, J. and Miles, C. (2004) *Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region,* Western Australian Local Government Association, West Perth.

Department of Biodiversity, Conservation and Attractions (2022) *Corporate Policy Statement No. 36: Conservation Reserve System*, Department of Biodiversity, Conservation and Attractions, Perth.

Department of Biodiversity, Conservation and Attractions (2016a) *Vegetation complexes – Swan Coastal Plain: Metadata,* Department of Biodiversity, Conservation and Attractions, Kensington.

Department of Biodiversity, Conservation and Attractions (2016b) *Vegetation complexes – South West forest region of Western Australia: Metadata,* Department of Biodiversity, Conservation and Attractions, Kensington.

Department of Biodiversity, Conservation and Attractions (2011) *North Batavia Coast Vegetation Flora and Vegetation Survey,* Department of Biodiversity, Conservation and Attractions, Geraldton.

Department of Planning, Lands and Heritage (2021) *Bush Forever Audit and Story Map:* "Keeping the bush in the city", Department of Planning, Lands and Heritage, Government of Western Australia.

Department of Primary Industry and Regional Development (2020) *Current extent of native vegetation – Western Australia: Metadata*, Department of Primary Industry and Regional Development, Perth.

Department of Primary Industry and Regional Development (2018) *Pre-European vegetation – Western Australia (NVIS compliant version 201 10715): Metadata,* Department of Primary Industry and Regional Development, South Perth.

Eastern Metropolitan Regional Council (2008) *Collective Local Biodiversity Strategy*. Eastern Metropolitan Regional Council on behalf of the Town of Bassendean, the City of Bayswater and the City of Belmont, Belmont.

Ecoscape (2020) *The Western Suburbs Greening Plan 2020-2025,* Western Suburbs Regional Organisation of Councils, Perth.

Ecotones & Associates (2024) 'Connectivity and viability', in *Shire of West Arthur Draft Local Biodiversity Strategy 2024*, Shire of West Arthur, Darkan.

EcOZ Environmental Consulting (2013) *Wheatbelt NRM Corridor Plan,* Wheatbelt NRM, Northam.

Environmental Protection Authority (2013) *Environmental Protection Bulletin No 12: Swan Bioplan – Peel Regionally Significant Natural Areas,* Office of the Environmental Protection Authority, Western Australia.

Environmental Protection Authority (2021) *Guidance for Planning and Development: Protection of naturally vegetated areas in urban and peri-urban areas*, Environmental Protection Authority, Western Australia.

Environmental Protection Authority (2008) *Guidance Statement No. 33: Environmental Guidance for Planning and Development*, Environmental Protection Authority, Western Australia

Geographic Information Service (2016) *Intensive land use zone of south west Western Australia [map],* Department of Primary Industries and Regional Development, Perth.

Government of Western Australia (2000) *Bush Forever – Keeping Bush in the City. Vol. 1: Policies, principles and processes,* Western Australian Planning Commission, Western Australia.

Government of Western Australia (2003) *State Planning Policy No. 2: Environment and Natural Resources Policy*, Western Australian Planning Commission, Western Australia.

Government of Western Australia (2010) *State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region*, Western Australian Planning Commission, Western Australia.

Government of Western Australia (2014) *State Planning Strategy 2050 – Executive Summary*, Western Australian Planning Commission, Western Australia.

Government of Western Australia (2014b) *Swan Bioplan Regionally Significant Natural Areas,* Environmental Protection Authority, Western Australia.

Government of Western Australia (2019a) *2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report),* Department of Biodiversity, Conservation and Attractions, Perth.

Government of Western Australia (2019b) *2018 South West Vegetation Complex Statistics,* Department of Biodiversity, Conservation and Attractions, Perth.

Government of Western Australia (2022a) *Native vegetation policy for Western Australia*, Department of Water and Environmental Regulation, Joondalup.

Government of Western Australia (2022b) *Native vegetation policy for Western Australia - Implementation roadmap*, Department of Water and Environmental Regulation, Joondalup.

Government of Western Australia (2025) *Conditions of supply – Flora, fauna and ecological community data,* Department of Biodiversity, Conservation and Attractions, Kensington.

Guthrie, N. (2012) Regional and Local Ecological Linkages for the Geraldton Local Biodiversity Strategy, in Zelinova, R., Dimitriadis, S. and Guthrie, N., Oh, T. *Geraldton Regional Conservation Report.*, vol. 1, Western Australian Local Government Association, West Perth.

Haddleton, C., Chambers, J. and Andrew, M. (2022) *NatureLinks Storymap*, NatureLink Perth Resources.

Harvey, J. and Keighery, G. (2012) *Benchmarking Wheatbelt Vegetation: Classification and Description of Eucalypt woodlands,* Wheatbelt Baselining Project, Wheatbelt Natural Resource Management Region and Department of Environment and Conservation, Perth.

Heddle, E.M., Loneragan, O.W. and Havel, J.J. (1980) Vegetation of the Darling System, in *Atlas of Natural Resources, Darling System, Western Australia*, Department of Conservation and Environment, Perth.

Keighery, B.J., Keighery, G.J., Webb, A., Longman, V.M. and Griffin, E.A. (2008) *A Floristic Survey of the Whicher Scarp*, report prepared for the Department of Environment and Conservation as part of the Swan Bioplan Project, Department of Environment and Conservation, Western Australia.

Keighery, B.J., Dell, J., Keighery, G.J., Madden, M., Longman, V.M., Green, B., Webb, A., McKenzie, B., Hyder, B., Ryan, R., Clarke, K.A., Harris, E., Whisson, G., Olejnik, C. and Richardson, A. (2006) *The Vegetation, Flora, Fauna and Natural Areas of the Peel Harvey Eastern Estuary Area Catchment (Swan Coastal Plain)*, report prepared for the Department of Environment and Conservation as a contribution to the Peel Harvey Eastern Estuary Area Catchment Environmental Assessment Project and Swan Bioplan Project, Department of Environment and Conservation, Western Australia.

Keeley, A.T.H., Beier, P. and Jenness, J.S. (2021) Connectivity metrics for conservation planning and monitoring, *Biological Conservation*, vol. 255, 109008.

Local Biodiversity Program (2014) *Celebrating thirteen years of Action for Biodiversity: Celebrating the legacy of Local Action for biodiversity in priority landscapes of the South West of Western Australia,* Western Australian Local Government Association, West Leederville.

Local Biodiversity Program (2014a) *Towards establishing a green network: Vegetation connectivity modelling - testing the effectiveness of a proposed green network for the South West Group member Local Governments*, Western Australian Local Government Association and Local Biodiversity Program, West Leederville.

Mattiske, E.M. and Havel, J.J. (1998) *Vegetation mapping in the South West of Western Australia and Regional Forest Agreement vegetation complexes: Map sheets for Pemberton, Collie, Pinjarra, Busselton-Margaret River, Mt Barker and Perth,* scale 1:250,000, Department of Conservation and Land Management, Perth.

Molloy, S. (2010) Regional and Local Ecological Linkages for the Shire of Chittering, in *Shire of Chittering Local Biodiversity Strategy*, Shire of Chittering, Bindoon.

Molloy, S., Wood, J., Wallrodt, S. and Whisson, G. (2009) *South West Regional Ecological Linkages – Technical Report,* Western Australian Local Government Association and Department of Environment and Conservation, Perth.

Molloy, S., O'Connor, T., Wood, J. and Wallrodt, S. (2007) *Local Government Biodiversity Planning Guidelines: Addendum for the South West Biodiversity Project Area*, Western Australian Local Government Association, West Perth.

Myers, N., Mittermeier, C.G., da Fonseca, G.A.B. and Kent, J. (2000) Biodiversity hotspots for conservation priorities, *Nature*, 403(6772), pp. 853-858. https://doi.org/10.1038/35002501

O'Donnell, C. (2020) *Evaluating connectivity and ecological linkages between Perth's protected areas to support biodiversity,* BSc (Honours) thesis, Murdoch University, Perth.

Oh, T. (2014) A morphological classifier for remnant vegetation, in Zelinova, R. *Towards establishing a green network – Vegetation connectivity modelling*, Western Australian Local Government Association and Local Biodiversity Program, West Leederville.

IUCN World Commission on Protected Areas (2020) *Guidelines for conserving connectivity through ecological networks and corridors: Technical note*, IUCN WCPA Technical Note Series No. 3, Gland, Switzerland: International Union for Conservation of Nature.

Samuel, G. (2020) *Independent Review of the EPBC Act – Final Report,* Department of Agriculture, Water and Environment, Canberra, October. CC BY 4.0

Sandiford, E.M. and Barrett, S. (2010) *Albany Regional Vegetation Survey: Extent, Type and Status*, Department of Environment and Conservation, Perth.

Shire of Chittering (2022) *Local Biodiversity Strategy,* Shire of Chittering.

Shire of Mundaring (2023) *Local Biodiversity Strategy 2023-2030,* Shire of Mundaring.

Shire of Northam (2015) *Local Biodiversity Strategy*, Shire of Northam.

Shire of West Arthur (2024) *Draft Local Biodiversity Strategy,* Shire of West Arthur.

Smith, P.L. and Sivertsen, D. (2001) *Native vegetation targets – Background Paper A: Landscape composition for the maintenance of biodiversity values in production-oriented landscapes*, NSW Department of Land and Water Conservation, Sydney.

State of Western Australia (2014) *A guide to the assessment of applications to clear native vegetation under Part V Division 2 of the Environmental Protection Act 1986,* Department of Environment Regulation, Perth.

Thackway, R. and Cresswell, D. (1995) *An Interim Biogeographic Regionalisation for Australia: a framework for setting priorities in the national reserves cooperative program*, Australian Nature Conservation Agency, Canberra.

Town of Cambridge (2022) *Natural Area Strategy 2022-2032*, Town of Cambridge.

Webb, A., Keighery, B.J., Keighery, G.J., Longman, V.M., Black, A. and O'Connor, A. (2009) *The Flora and Vegetation of the Busselton Plain (Swan Coastal Plain),* Unpublished report prepared for the Department of Environment and Conservation as part of the Swan Bioplan Project.

Webb, A., Kinloch, J., Keighery, G.J. and Pitt, G. (2016) *The extension of vegetation complex mapping to landform boundaries within the Swan Coastal Plain landform and forested region of south west Western Australia,* Department of Biodiversity, Conservation and Attractions, Kensington.

Western Australian Local Government Association (2016) *Local Biodiversity Planning for Local Government in the South West of Western Australia*, training presentation.

Western Australian Local Government Association (2018) *Application of ecological criteria in the Perth Metropolitan Region (with overlay of Bush Forever areas and DBCA managed land)*, map reproduced in Local Biodiversity Planning/Perth Biodiversity Project materials.

Western Australian Local Government Association (2020) *Natural Area Prioritisation for Perth and Peel [Dataset]*, DataWA, Western Australian Government.

Western Australian Local Government Association (2021) *Local Biodiversity Planning analysis based on 2020 native vegetation extent mapping*, Western Australian Local Government Association, West Leederville.

Western Australian Local Government Association (2021b) *Local conservation type reserves over Metropolitan Region Scheme zoning: Figure in Local Biodiversity Planning Summary*. Source: LGmap, Western Australian Local Government Association.

Western Australian Local Government Association (2025) *Local Government Road Assets and Expenditure Report 2024-25*, Western Australian Local Government Association, West Leederville.

Western Australian Planning Commission (2010) *Geraldton regional flora and vegetation survey*, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (2011) *Directions Paper on the Integration of NRM into Land Use Planning,* Department of Planning, EnviroPlanning and Western Australian Local Government Association, Perth.

Western Australian Planning Commission (2023) *Local Planning Strategy Guidelines*, Department of Planning, Lands and Heritage, Perth.

Wilkins, P., Gilfillan, S., Watson, J. and Sanders, A. (2006) *The Western Australian South Coast Macro Corridor Network – a bioregional strategy for nature conservation,* Department of Conservation and Land Management and South Coast Regional Initiative Planning Team, Albany.

Zelinova, R., Dimitriadis, S., Guthrie, N. and Oh, T. (2012) *Geraldton Regional Conservation Report (GRCR),* Perth Biodiversity Project, Western Australian Local Government Association, Perth.

Resources

Appendix 1: Preparation of a local biodiversity strategy

Bold text identifies activities that can be undertaken by a consultant.

Project phases	Key activities/deliverables	Notes
Establishment of a Working Group and Steering Committee	First meeting: • Agree on Terms of Reference and responsibilities • Outline and agree on a methodology and communication strategy • Clarify any data gaps	Working Group to consist of Local Government staff from planning and asset management directorates Steering Committee to include community representatives and Councillors
Assessment of biodiversity values	Collation of spatial datasets and reports on biodiversity assets in the Local Government area, including the mapping of LNAs	Any internal mapping (e.g. vegetation condition, habitat, restoration sites) See Appendix 3
	Select ecological criteria for prioritisation of LNAs/review past prioritisation where applicable	
Assessment of opportunities for, and constraints to, biodiversity conservation	Review of the local planning framework to assess opportunities for, and constraints to, biodiversity conservation provided by the local land use planning provisions	
	Inventory of lands vested in Local Governments (Crown reserves by vesting purpose, road reserves by conservation values)	
Stakeholder Reference Group meetings	First stakeholder meeting: • Agree on Terms of Reference and responsibilities • Discuss initial findings • Determine local conservation objectives • Agree on prioritisation criteria for LNAs	Facilitated by Local Government with option of consultant presenting Utilising existing Local Government Advisory Groups is recommended where available
	Schedule at least one or two follow up meetings to seek feedback on the draft local biodiversity strategy prior to release for public consultation	
Identification of Indicative High Conservation Value Areas	Identification of ecological linkages	
	Application of LNA prioritisation criteria and opportunities and constraints	
	Identification of Indicative High Conservation Value LNAs, considering connectivity (spatially)	

	Identification of potential implementation mechanisms to meet the conservation objectives, including a spatial plan (or bushland protection map) and the Action Plan	Bushland protection maps identify spatially where implementation mechanisms will apply to meet the conservation objectives (e.g. areas to be formally protected to increase representation of locally significant vegetation types and/or known threatened species and communities)
	Presentation to the Working Group	
	Review outputs based on feedback from the Working Group	
Preparation of the draft local biodiversity strategy	**Finalise the draft local biodiversity strategy and distribute to the Working Group and Steering Committee**	
	Working Group meeting (if necessary)	
	Stakeholder meeting(s) to discuss the draft before being finalised and presented to the Council	
	Final version of the draft local biodiversity strategy and spatial data provided to Local Government	
Community consultation	Seek Council approval to release the draft local biodiversity strategy for public comment	Public consultation should be consistent with consultation required for local planning scheme amendments
Finalisation of the local biodiversity strategy	Compile comments from public consultation, provide response and advise members of the Steering Committee about the outcomes of consultation	
	Prepare final local biodiversity strategy (including any changes following public consultation)	
	Seek Council endorsement of the final local biodiversity strategy	

Appendix 2: Terms of Reference – Local Biodiversity Planning Steering Committee

Purpose

To oversee the development of the Shire/Town/City of [insert name] local biodiversity strategy.

Background

The Shire/Town/City of [insert name]'s Community Strategic Plan [YEAR] (or other relevant strategic document) sets out the community's aspirational objectives and outcomes for several areas, including the natural environment. Local biodiversity planning and the development of a local biodiversity strategy provides a mechanism to support these outcomes, as it identifies key natural assets in the Shire/Town/City and ways to manage them. Local biodiversity planning will assist the Shire/Town/City to:

- Determine the status and conservation significance of local natural areas[4]
- Formalise policies and processes for integrating biodiversity considerations in decision making, including land use planning, design and delivery of Shire/Town/City infrastructure projects
- Identify opportunities for incentives to encourage biodiversity conservation on private lands
- Plan for the management of local reserves and other Shire/Town/City lands to conserve biodiversity.

To address the underlaying causes of biodiversity loss, biodiversity needs to be considered by all that benefit from interactions with nature, including all levels of government and society. Thus, the local biodiversity planning process requires involvement and support from all operational sections of the Local Government and the community.

Role of the Steering Committee

The Steering Committee will provide strategic advice on technical and consultative issues that arise during the local biodiversity planning process, with specific focus on:

- The development of the vision, objectives and targets for the draft local biodiversity strategy
- A review of the prioritisation criteria for local natural areas
- Assistance with the identification of feasible actions for improved biodiversity outcomes in the Shire/Town/City
- A review of the draft local biodiversity strategy prior its release for public comment
- Assistance with the integration of feedback received during public comment to develop a finalised version of the local biodiversity strategy for adoption by the Council.

[4] Local natural areas in local biodiversity planning are defined as all natural areas within a Local Government area that are not managed by DBCA and, where applicable, are outside Bush Forever Areas and Regional Parks.

Responsibilities of the Shire/Town/City

The Shire/Town/City is responsible for governance, executive and administrative support, communications and reporting.

Membership

The Steering Committee will consist of the following representation:

- Elected Members (one representative from environmental advisory and planning committees or equivalent) – with one acting as Chair
- Executive Managers from planning and asset management
- Community representatives with understanding of biodiversity management
- Community representative from relevant Aboriginal groups.

Conflicts of interest

If a member believes they may have a conflict of interest, the member should inform the Chair, who will determine how the conflict of interest will be managed.

Timeframe

The Steering Committee is expected to operate for 18 months or until the finalised local biodiversity strategy is adopted by the Council.

Appendix 3: Example of LNA prioritisation criteria

Ecological criteria for natural area prioritisation in the Metropolitan and Peel Region Scheme Areas (WALGA, 2020)

This set of criteria was developed as part of the Regional Framework for Local Biodiversity Conservation Priorities for Perth and Peel project, delivered via WALGA's Perth Biodiversity Project in 2012. In 2023-2014, the criteria were extended for the Shire of Harvey and Shire of Boddington. Since then, the mapping layer was periodically updated using datasets current at the time of the update. The last updated version was published in 2022 via data.wa.gov.au.

Key to a Priority Field in the mapping layer	Criteria	Spatial data representation of remnant vegetation extent within the following categories	State and Australian Government legislation and policy supporting the criteria
Representation – Regional			
P1_1	recognised international, national or regional conservation value	DBCA Legislated Lands and Waters: National Park, Nature Reserve, Conservation Park, Section 5 (1) (g) Regional Parks Bush Forever sites Peel Regionally Significant Natural Areas Crown Reserves - 'Conservation type vesting' Informal Reserves DBCA Conservation Covenants Ramsar wetlands Directory of Important Wetlands	*Environmental Protection and Biodiversity Conservation Act 1999* for some areas EPA Guidance Statement No. 33 (EPA, 2008) Forest Management Plan 2004-2013 (Conservation Commission, 2003) State Planning Policy 2.8: Bushland Policy for Perth Metropolitan Region (June 2010) Statement of Planning Policy No 2: Environment and Natural Resources (WAPC, 2003) Forest Management Plan 2014-2023 (Guidelines for Protection of the Values of Informal Reserves and Fauna Habitat Zones)
P1_2a	of an ecological community with only 1500 ha or 30% or less **remaining and <10% protected (formal)** in the IBRA sub-region (here we use <or=40%)	2020 Vegetation extent by vegetation complexes: Bassendean complex Central and South, Beermullah, Cannington, Coolakin, Dardanup, Cottesloe Central and South, Dardanup, Forrestfield, Guildford, Karrakatta Central and South, Mogumber South, Pinjar, Reagan, Serpentine River, Southern River, Swan, Vasse, Yanga+ Cartis, Darling Scarp D1, Lowdon, Michibin, Williams, Yoongarillup	*Environmental Protection Act 1986* *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* EPA Guidance Statement No. 33 (EPA, 2008) Australia's Biodiversity Conservation Strategy 2010-2030 (October 2010)
P1_2b	of an ecological community with only 1500 ha or 30% or less **remaining** in the	2020 Vegetation extent by vegetation complexes: Dardanup, Bassendean complex Central and South, Beermullah, Cannington,	*Environmental Protection Act 1986* *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* EPA Guidance Statement No. 33 (EPA, 2008)

	IBRA sub-region (here we use <or=40%)	Coolakin, Cottesloe Central and South, Dardanup, Forrestfield, Guildford, Herdsman, Karrakatta Central and South, Mogumber South, Pinjar, Reagan, Serpentine River, Southern River, Swan River, Vasse, Yanga, Yoongarillup + Cartis, Darling Scarp D1, Lowdon, Michibin, Williams,	Australia's Biodiversity Conservation Strategy 2010-2030 (October 2010)
P1_2c	of an ecological community with 90-100% of its original proportion of the original extent occurs within the study area	Pre-European extent of vegetation complexes in IBRA sub-region: Beermulah, Cannington, Cottesloe Central and South, Forrestfield, Herdsman, Pinjar, Helena 2	
P1_2d	of an ecological community with 60-89% of its original proportion of the original extent occurs within the study area	Pre-European extent of vegetation complexes in IBRA sub-region: Bassendean Central and South, Guildford, Karrakatta Central and South, Serpentine River, Swan, Darling Scarp, Quindalup, Dwellingup D2, Helena 1	
P1_3	large (greater than 20 ha) natural areas	Remnant vegetation in patches greater than 20 ha	
P1_4	of an ecological community with only 1500 ha or 15% or less **protected** for conservation in the Jarrah Forest sub-region	2020 Vegetation extent by vegetation complexes: Cooke, Coolakin, Dwellingup D1-D4, Darling Scarp, Murray 2, Pindalup, Yalanbee 5, Yalanbee 6, Yarragil 1, Yarragil 2 + Lowdon, Michibin, Williams	*Environmental Protection Act 1986* *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* EPA Guidance Statement No. 33 (EPA, 2008) Forest Management Plan 2004-2013 (Conservation Commission, 2003)
P1_5	of an ecological community with only 400 ha or 10% or less **protected** for conservation on the Swan Coastal Plain portion of Perth and Peel	2020 Vegetation extent by vegetation complexes: Bassendean Central and South, Beermullah, Cannington, Coonambidgee, Cottesloe Central and South, Dardanup, Forrestfield, Guildford, Karrakatta Central and South, Karrakatta North, Mogumber-South, Pinjar, Quindalup, Reagan, Serpentine River, Southern River, Swan, Yanga	*Environmental Protection Act 1986* *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* EPA Guidance Statement No. 33 (EPA, 2008) State Planning Policy 2.8: Bushland Policy for Perth Metropolitan Region (June 2010) Bush Forever (Government of Western Australia, 2000)
Rarity			
P3_1	of an ecological community with only 1500 ha or 10% **remaining** in the IBRA sub-region	2020 Vegetation extent by vegetation complexes: Beermullah, Cannington, Cartis, Dardanup, Darling Scarp D1, Forrestfield, Guildford, Pinjar,	*Environmental Protection Act 1986* *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* EPA Guidance Statement No. 33 (EPA, 2008)

		Serpentine River complex, Swan River Complex	
P3_2	of an ecological community with only 400 ha or 10% or less **remaining** in the Bush Forever and Peel section of the Swan Bioplan Areas	2020 Vegetation extent by vegetation complexes: Beermullah, Cannington, Coonambidgee, Dardanup, Forrestfield, Guildford, Mogumber South, Reagan, Serpentine River complex, Swan Complex	*Environmental Protection Act 1986* *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* EPA Guidance Statement No. 33 (EPA, 2008) State Planning Policy 2.8: Bushland Policy for Perth Metropolitan Region (June 2010) Bush Forever (Government of Western Australia, 2000)
P3_3	contains a Threatened Ecological Community (TEC)	TEC boundaries and buffers	*Environmental Protection and Biodiversity Conservation Act 1999* *Environmental Protection Act 1986* *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* EPA Guidance Statement No. 33 (EPA, 2008) *Biodiversity Conservation Act 2016*
P3_4	contains a Priority Ecological Community (PEC)	PEC (Priority 1, 2, 3) and buffers	*Environmental Protection Act 1986* *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* EPA Guidance Statement No. 33 (EPA, 2008) *Biodiversity Conservation Act 2016*
P3_5	contains Threatened Flora	Threatened Flora locations with buffers	*Environmental Protection and Biodiversity Conservation Act 1999* *Environmental Protection Act 1986* *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* *Biodiversity Conservation Act 2016* EPA Guidance Statement No. 33 (EPA, 2008)
P3_6	contains Priority 1, 2, 3, 4 Flora	Priority Flora with buffers	EPA Guidance Statement No. 33 (EPA, 2008) *Biodiversity Conservation Act 2016*
P3_7	Threatened and specially protected fauna	Threatened Fauna (CR, EN, VU, OS - Other Specially Protected)	*Environmental Protection and Biodiversity Conservation Act 1999* *Biodiversity Conservation Act 2016* EPA Guidance Statement No. 33 (EPA, 2008)
P3_8	priority fauna	Priority 1, 2, 3, 4 Fauna	EPA Guidance Statement No. 33 (Environmental Protection Authority, 2008) *Biodiversity Conservation Act 2016*
P3_9a	significant habitat for significant fauna	Areas requiring investigation for Carnaby's cockatoo feeding habitat (Swan Coastal Plain)	*Environmental Protection and Biodiversity Conservation Act 1999* *Biodiversity Conservation Act 2016* EPA Guidance Statement No. 33 (EPA, 2008) Environmental Protection (Western Swamp Tortoise Habitat) Policy (2011)
		Areas requiring investigation for Carnaby's cockatoo feeding habitat (Jarrah Forest)	
P3_9b		Carnaby's Cockatoo habitat - breeding sites (confirmed and possible) with 12 km buffer	

P3_9c		Carnaby's Cockatoo habitat - roosting sites (confirmed and unconfirmed) with 6 km buffer	
P3_9d		Western Swamp Tortoise Critical Habitat Policy Area (EPP, 2010)	
P3_10	contains other significant flora	Significant flora - range ends and disjunct populations; Swan Coastal Plain endemics based on Gibson *et al* (1994)	
		Tuart woodlands	*Environmental Protection and Biodiversity Conservation Act 1999* *Biodiversity Conservation Act 2016* EPA Guidance Statement No. 33 (EPA, 2008)
P3_11	contains other significant fauna	Decliner Bird Species	EPA Guidance Statement No. 33 (EPA, 2008) *Biodiversity Conservation Act 2016*
Maintaining ecological processes or natural systems – connectivity			
P4_1	natural areas acting as stepping stones in a regionally significant ecological link	Connectivity layer - current remnant vegetation that touches the Perth Metropolitan Region Regional Ecological Linkages or South West Regional Ecological Linkages 500 m wide axis line (plus three additional lines from working group meeting in the Peel Region)	Australia's Biodiversity Conservation Strategy 2010-2030 (October 2010) EPA Guidance Statement No. 33 (EPA, 2008) Statement of Planning Policy No. 2: Environment and Natural Resources (WAPC, 2003)
Protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation			
P5_1	Remnant vegetation within Conservation Category Wetlands with a 50 m buffer	Geomorphic wetland mapping	Water and Rivers Commission Position Statement: Wetlands (2001) Wetlands Conservation Policy for Western Australia (Government of Western Australia, 1997) *Environmental Protection Act 1986 (Environmental Protection (Clearing of Native Vegetation) Regulations 2004* EPA Guidance Statement No. 33 (EPA, 2008) Statement of Planning Policy No. 2: Environment and Natural Resources (WAPC, 2003)
P5_1b	Remnant vegetation within Resource Enhancement Wetlands with a 50 m buffer	Geomorphic wetland mapping	Water and Rivers Commission Position Statement: Wetlands (2001) Wetlands Conservation Policy for Western Australia (Government of Western Australia, 1997) *Environmental Protection Act 1986 (Environmental Protection (Clearing of Native Vegetation) Regulations 2004* EPA Guidance Statement No. 33 (EPA, 2008) Statement of Planning Policy No. 2: Environment and Natural Resources (WAPC, 2003)

P5_3	riparian vegetation	riparian vegetation surrogate - hydro lines buffered and used to intersect with current remnant vegetation	*Swan and Canning River Management Act 2006* Statement of Planning Policy No. 2: Environment and Natural Resources (WAPC, 2003) Statement of Planning Policy No. 2.1: Peel-Harvey Coastal Plain Catchment (Government of Western Australia, 1992) EPA Guidance Statement No. 33 (EPA, 2008) Development Control Policy No. 2.3: Public Open Space (WAPC, 2002)
P5_4	floodplain area	floodplain areas	Statement of Planning Policy No. 2: Environment and Natural Resources (WAPC, 2003) *Swan and Canning River Management Act 2006* Statement of Planning Policy No. 2.1: Peel-Harvey Coastal Plain Catchment (Government of Western Australia, 1992) Environmental Protection (Peel Inlet-Harvey Estuary) Policy (EPA, 1992) EPA Guidance Statement No. 33 (EPA, 2008) Development Control Policy No. 2.3: Public Open Space (WAPC, 2002)
P5_5	estuarine area	hydrography - estuarine	EPA Guidance Statement No. 33 (EPA, 2008) Statement of Planning Policy No. 2: Environment and Natural Resources (WAPC, 2003) Environmental Protection (Peel Inlet-Harvey Estuary) Policy (EPA, 1992) Development Control Policy No. 2.3: Public Open Space (WAPC, 2002)
P5_6	coastal vegetation on foredunes and secondary dunes	Q3 and Q4 units in the Soil Landscape Units Remaining Quindalup Soil Landscape Units within 150 m from the coastline	EPA Guidance Statement No. 33 (EPA, 2008) Statement of Planning Policy No. 2.6: State Coastal Planning Policy (Government of Western Australia, 2003) Position Statement – State Planning Policy No. 2.6: State Coastal Planning Policy Schedule 1 Sea Level Rise (WAPC, 2010) Statement of Planning Policy No. 2: Environment and Natural Resources (WAPC, 2003) Development Control Policy No. 2.3: Public Open Space (WAPC, 2002)
Representation – Local			
P6_1	of an ecological community with 10% or less **remaining** within a **Local Government area**	2020 remnant vegetation extent by vegetation complexes within each Local Government in the Perth and Peel Region Schemes' areas and Shires of Harvey and Boddington	EPA Guidance Statement No. 33 (EPA, 2008)
P6_2	of an ecological community with 30% or less **remaining** within a **Local Government area**	2020 native vegetation extent by vegetation complexes within each Local Government in the Perth and Peel Region Schemes' areas and Shires of Harvey and Boddington	EPA Guidance Statement No. 33 (EPA, 2008)

Appendix 4: General principles for identifying local ecological linkages

The following information has been reproduced from:

Del Marco, A., Taylor, R., Clarke, K., Savage, K., Cullity, J. and Miles, C. (2004) *Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region,* Western Australian Local Government Association, West Perth, pp. 70-71.

General principles that should be used for identifying local ecological linkages are:

- Choose **continuous corridors** of native vegetation with a minimum width of 500 m
    - Thin corridors along roads mainly consisting of trees over a highly disturbed understorey are of little value except for already highly mobile species
- If continuous corridors are not available, choose a linkage made up of natural areas that form **stepping stones** between larger intact areas. Aim for a linkage where:
    - The maximum distance between natural areas is 500 – 1000 m
    - Natural areas are at least one to four hectares in size
    - No major regional roads or transport routes are crossed
- Include the **widest range** of habitat types as possible within the linkages
- **Maximise the number** of linkages to improve connectivity.

High priority natural areas for inclusion in a linkage are those:

- With direct linkages to Regionally Significant Natural Areas or Regional Ecological Linkages
- That form a network of linkages across the north-south and east-west gradients of variation in ecological communities within a Local Government area (due to soils, geology, landforms and climate)
- Located within 500 m of a Bush Forever site, DBCA Managed Estate, System 6 area, other areas of regional value, protected LSNA (>10 ha)
- Including riparian vegetation along waterways
- At high points in the landscape that are in the line of sight of other natural areas.

To improve connectivity once the local ecological linkages are identified:

- Focus management on improving the condition of existing natural areas
- Use bush regeneration techniques to increase the size of natural areas within the linkage.