

Draft Lower Hunter Regional Conservation Plan

October 2006

Department of **Environment and Conservation** NSW



Prepared by the Department of Environment and Conservation NSW

© Department of Environment and Conservation NSW 2006

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced without prior permission from the Department of Environment and Conservation NSW.

Department of Environment and Conservation NSW
Locked Bag 914
Coffs Harbour NSW 2450
Tel: 02 6651 5946
Fax: 02 6651 6187
www.environment.nsw.gov.au

This draft Lower Hunter Regional Conservation Plan presents significant new Government conservation commitments that have been made as part of finalising the Lower Hunter Regional Strategy. The plan also canvasses other matters including supplementary and subsequent implementation mechanisms. These future steps will be refined following a period of public exhibition and consultation. Comments to assist in this process are welcome and should be forwarded in writing. The closing date for receipt of comments is 17 November 2006. Please forward your comments to:

The Manager,
Special Projects (Biodiversity Conservation)
Environment Protection and Regulation Division
Department of Environment and Conservation
Locked Bag 914
Coffs Harbour NSW 2450

or email to:
neb.rcp@environment.nsw.gov.au

The material provided in the Lower Hunter Regional Conservation Plan is for information purposes only. It is not intended to be a substitute for legal advice in relation to any matter, whether particular or general.

This document should be cited as: DEC 2006, Lower Hunter Regional Conservation Plan (draft), Department of Environment and Conservation NSW, Coffs Harbour, NSW.

ISBN: 1 92088 773 3
DEC 2006/538
October 2006

Executive Summary

What this Plan will deliver

This Plan sets out a 25-year program to direct and drive conservation efforts in the Lower Hunter Valley. It is a partner document to the Government's Lower Hunter Strategy that sets out the full range of Government planning priorities, and identifies the proposed areas for growth.

The Plan includes announcements of significant Government conservation decisions and also seeks feedback on remaining key implementation and longer-term design issues.

Although the Plan is focused on the next 25 years, an enormous start has been made on its implementation through historic new commitments such as:

- over 20,000 hectares of various high conservation value Government lands will be reserved in perpetuity to form the backbone of major new conservation corridors
- approximately 12,000 hectares of high conservation value freehold land will be secured for additions to new and existing reserves in exchange for appropriate development rights, to be implemented as the land is rezoned.

The new reserves will include:

- a new 'Green Corridor' stretching from Watagans Ranges, through Hexham Swamp to Port Stephens (approximately 14,600 hectares)
- a green buffer on the South Wallarah Peninsula to separate Newcastle from the Central Coast (approximately 1,250 hectares)
- important areas around Ports Stephens in the Karuah area (3,000 hectares)
- a large addition to Werakata National Park near Cessnock (2,200 hectares)
- two new parks containing under-reserved endangered ecological communities on the Hunter Valley floor near Branxton and at Elderslie (1,330 hectares)
- a new park encompassing Ellalong Lagoon, which contains important freshwater wetland communities (430 hectares)
- other large additions to Wollemi and Yengo national parks (6,000 hectares).

The Plan also:

- canvasses tools and mechanisms that could be used in the medium- to longer-term to secure additional lands needed to complete the corridors for optimal land management boundaries
- explains how development will be guided away from high conservation areas through the identification of a desired development footprint and the definition of other areas where the Government's sustainability criteria will or will not operate (if met, these criteria allow development to proceed outside the planned footprint)
- provides direction for local councils who are preparing new Local Environmental Plans, so that they may merit biodiversity certification (certification by the Minister for the Environment streamlines development assessment and approvals where Plans will ensure overall maintenance or improvement of biodiversity values)
- identifies a further 65,000 ha as 'other regional conservation priorities' that should be the focus for voluntary conservation initiatives, areas for future offsetting of development impacts and for government biodiversity investments (such as through the Catchment Management Authority (CMA)).

Through the process of consultation and evaluation of the draft Regional Strategy, the Government has resolved the key spatial issues of where development and new conservation reserves are to be established. The Government is seeking feedback on:

- how the plan and future activities of the Department of Environment and Conservation NSW (DEC) should be adapted to ensure integration with sub-regional plans or knowledge held by councils, the CMA, Aboriginal groups, community groups, interested landholders, and others
- the best way to optimise conservation values within development footprints through excellence in urban design
- establishing partnerships and deploying the best tools to ensure effective implementation and regular review

Contents

1	Introduction	1
1.1	What is biodiversity?	1
1.2	Objectives of the plan	1
1.3	Where does the plan apply?	1
1.4	Regional land use summary	1
1.4.1	Population trends	1
1.4.2	Existing and forecast settlement trends	2
1.5	Outline of the plan.....	2
2	Planning Framework.....	3
2.1	Why prepare a Regional Conservation Plan?.....	3
2.2	Legislative framework	4
2.3	Biodiversity planning principles and priorities	5
2.4	Who should use this plan?.....	5
2.5	Land-use planning system context	6
2.6	Ongoing review of the Regional Conservation Plan	7
3	Conservation Objectives	8
3.1	Conservation objectives for the Lower Hunter	8
3.2	Targets for vegetation communities.....	8
3.3	Features of special conservation significance	9
3.4	Fauna targets.....	9
3.5	Assigning relative conservation value.....	9
3.6	Reserve design.....	10
4	Conservation Assessment.....	12
4.1	Biodiversity values of the Lower Hunter.....	12
4.1.1	Regional overview	12
4.1.2	Vegetation	12
4.1.3	Major ecosystems	12
4.1.4	Fauna	14
4.2	Conservation status of the Lower Hunter.....	14
4.2.1	Overview	14
4.2.2	Regional analysis	14
4.3	Threats to the biodiversity of the Lower Hunter	16
5	Potential Impacts of the Regional Strategy	17
5.1	Potential biodiversity impacts of the regional strategy	17
5.2	Potential biodiversity impact of the LHRS development scenarios.....	17

5.3	Potential biodiversity impacts in areas currently zoned for development.....	20
6	Biodiversity Investment Guide	22
6.1	Purpose of the guide.....	22
6.2	A 25-year investment strategy	22
6.3	New reserve proposals.	23
6.3.1	Conservation values of the reserves	24
6.3.2	Community benefits of the reserves.....	26
6.4	Other regional conservation priorities	27
	West Lake Macquarie	27
6.5	Ongoing refinement of the 25-year investment strategy	28
7	Assessing anticipated biodiversity gains and losses	31
7.1	What does 'improve or maintain biodiversity' mean?.....	31
7.2	What does 'offsetting' mean?.....	32
7.3	Offsetting principles	32
7.4	Biodiversity Forecasting Tool.....	32
7.4.1	Applying the BFT.....	33
7.4.2	BFT estimate of anticipated gains and losses.....	34
8	Implementation Mechanisms	35
8.1	Stage 1 – Immediate implementation	35
8.2	Stage 2 – Mechanisms	36
8.2.1	Biodiversity Offsets and Banking Scheme	36
8.2.2	Planning Agreements	37
8.2.3	Voluntary Conservation Agreements.....	37
8.2.4	Covenants	38
8.2.5	Management agreements	38
8.2.6	LEP making and certification.....	38
8.2.7	Environmental impact considerations.....	38
8.2.8	Property Vegetation Planning.....	39
8.2.9	Catchment management	39
8.2.10	Priority actions for threatened species recovery	40
8.3	Protection of biodiversity values via the sustainability criteria	40
8.4	Optimising urban development through design	40
8.5	Additional support to be provided	41
9	References.....	42
	Appendix 1 – Offsetting Principles.....	43

1 Introduction

1.1 What is biodiversity?

Biological diversity, or biodiversity, is defined for the purpose of this plan as:

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

Genetic diversity refers to the variety of genetic information contained in all individual plants, animals and micro-organisms.

Species diversity refers to the variety of species for a given area. Species diversity is usually a measure of the number of species (richness) and their relative abundances for a given area at a given point in time.

Ecosystem diversity refers to the variety of habitats, biotic communities and ecological processes (NPWS 1999).

Biodiversity is a finite resource and it contributes to the maintenance of essential ecological processes (Fallding et al. 2001). Biodiversity underpins human wellbeing through the provision of ecological services such as those that are essential for the maintenance of soil fertility and clean, fresh water and air. It also provides recreational opportunities and is a source of inspiration and cultural identity (Commonwealth of Australia 1996).

1.2 Objectives of the plan

The primary objectives of the Regional Conservation Plan (RCP) are to complement the Government's Planning Strategy by:

- describing the conservation values of the Lower Hunter region
- analysing the current status of biodiversity within the region, and assessing the likely impacts of development identified in the Lower Hunter Regional Strategy (LHRS)
- assessing the biodiversity values of the region, at a landscape scale, and identifying strategic areas for biodiversity protection, enhancement or restoration
- contributing to a practical framework that can secure, maintain and improve biodiversity values as the Hunter grows over the next 25 years
- guiding local level planning with respect to biodiversity, including the development of local biodiversity conservation strategies and the development of new Local Environmental Plans (LEP) that can merit biodiversity certification.

1.3 Where does the plan apply?

This RCP applies to the same Local Government Areas (LGAs) covered by the LHRS; namely Maitland, Cessnock, Lake Macquarie, Port Stephens and Newcastle City councils. It also includes actions in the north east of Wyong Council area at Gwandalan and the Wallarah Peninsula.

1.4 Regional land use summary

1.4.1 Population trends

As outlined within the LHRS, the Lower Hunter had an estimated population of 505,000 in 2004 and is growing by approximately 4,000 persons each year.

The LHRS is based upon a population growth scenario which forecasts a population increase averaging up to 6,000 persons per year. This would result in an additional 160,000 persons over the 25-year period between 2006 and 2031.

1.4.2 Existing and forecast settlement trends

The strategy identifies that of all new housing within the Lower Hunter, 60% will be accommodated within greenfield development areas, with the remaining 40% located in existing urban land-use zones. The strategy will also ensure an adequate supply of employment land within identified centres and other specialised/industrial lands to accommodate the projected 66,000 new jobs.

Although the development footprint has been located to maximise use of already cleared or degraded land, there will be losses of biodiversity values as the strategy is implemented, including areas of high conservation value vegetation. The Strategy includes significant measures to offset these unavoidable losses.

1.5 Outline of the plan

The RCP:

- analyses the impacts of the urban development scenarios in the LHRS
- presents a biodiversity investment guide that identifies areas that could be targeted for public or private land conservation or restoration
- identifies mechanisms for biodiversity conservation through investment in the Lower Hunter (at a landscape level)
- provides a guide for local government authorities to plan for biodiversity protection, conservation and management, and plans local environment planning instruments.

To support planning at a local scale, the Department of Environment and Conservation NSW (DEC) will prepare the following additional information:

- guidelines for biodiversity certification
- survey and assessment guidelines for biodiversity (or wildlife/flora and fauna) (refer to www.nationalparks.nsw.gov.au/pdfs/tbsa_guidelines_draft.pdf for a copy of the draft guidelines)
- policy and documentation on the use of the biodiversity forecasting tool for regional and local planning processes
- documentation and training of DEC's proposed BioBanking Scheme
- guidelines for environmental impact assessment of biodiversity values in areas identified for development
- a summary of the Priorities Action Statement relevant to each region/LGA.

The Plan takes into account the significant amount of high conservation value vegetation likely to be impacted on in the new development footprint and in areas that are already zoned for development, including for residential and industrial subdivisions, but that are as yet undeveloped.

This Plan does not assess the impacts of likely new essential infrastructure and State significant projects likely to be developed within the 25-year strategy time frame, as these cannot yet be spatially identified in the Strategy. These are likely to include new coal mines, major roads, pipelines and powerlines. The LHRS also acknowledges the potential for development of additional greenfield residential releases in some areas where these meet the its Sustainability Criteria. As these areas also cannot be identified at this stage, this Plan cannot assess their potential impacts. The Plan does, however, foreshadow mechanisms that will be available to offset unavoidable impacts where they arise.

2 Planning Framework

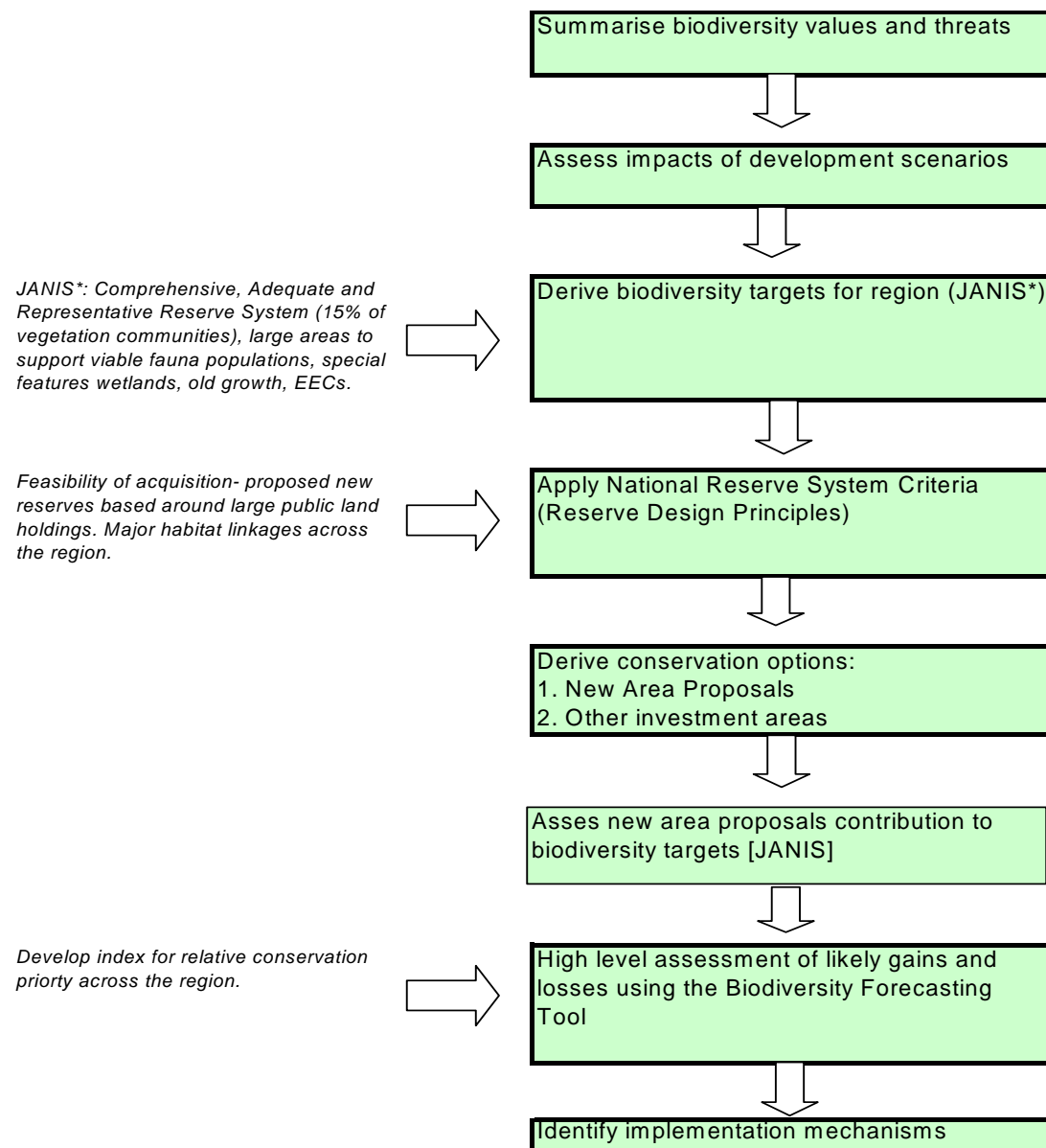
2.1 Why prepare a Regional Conservation Plan?

The primary purpose of the LHRS is to ensure that adequate land is available and development is appropriately located to sustainably accommodate the projected housing, employment and environmental needs of the region's population over the next 25 years. This Conservation Plan has been developed:

- to assess the extent of the biodiversity impacts of the LHRS and recommend priority areas for investment in biodiversity conservation and environmental repair and restoration to offset these impacts
- with the recognition that development certainty and conservation outcomes are best achieved by good strategic planning at a regional scale, rather than at the development application stage
- to assist with the implementation of the recent amendments to the *Threatened Species Conservation Act 1995*, including biodiversity certification of environmental planning instruments and biobanking
- to be consistent with, and promote the principles of Ecologically Sustainable Development.

An overview of the process for developing the RCP is shown in Figure 1.

Figure 1: Development of the Lower Hunter Regional Conservation Plan



*JANIS is a technical working group comprising conservation scientists and planners from all States, the Northern Territory, and the CSIRO. It was established in 1993 under the auspices of the Joint ANZECC/MCFFA NFPS Implementation Sub-Committee (JANIS) to draft criteria on which to base a comprehensive, adequate and representative reserve system for Australia's forests.

2.2 Legislative framework

The *Threatened Species Legislation Amendment Act 2004* substantially amended a number of the provisions of the *Threatened Species Conservation Act 1995* (TSC Act). A key theme of the reforms to the TSC Act has been to shift the focus of conservation efforts from individual development sites to protecting and restoring habitat at a landscape scale.

One of the key mechanisms to give effect to this renewed focus on strategic planning is the opportunity for biodiversity certification to be granted to Environmental Planning Instruments (EPI), including LEPs. Essentially, the biodiversity certification process provides a structured way to ensure that biodiversity issues are considered in a comprehensive way, up-front and at the earliest possible stage of the planning process.

The broad advantages of biodiversity certification are that it provides:

- a basis for informed broad scale decision making
- a process to empower communities to plan for conservation
- a planning process to address cumulative effects of development on biodiversity
- a certified EPI that delivers more certainty and quicker decision-making for industry, and better outcomes for the broader community and biodiversity.

Consideration of this Plan will be an important first step in the path to securing biodiversity certification for new LEPs. The effect of biodiversity certification is that it largely ‘switches off’ the need for consideration of the test of significance, otherwise known as a Section 5A assessment or seven-part test at individual sites. This has important implications for the development industry and to consent and determining authorities, as a certified LEP creates a high degree of certainty with respect to biodiversity management on a site-by-site basis.

To support this new process, legislative reforms are underway to amend the *Threatened Species Conservation Act 1995* to implement a Biobanking Scheme in NSW. This will provide a structure for offsetting biodiversity losses using a market-based mechanism. This Plan will guide Biobanking and other offsetting mechanisms in the Lower Hunter to ensure that biodiversity investment funds are focused in areas to provide maximum biodiversity returns.

2.3 Biodiversity planning principles and priorities

Effective ongoing biodiversity management and planning is necessary to ensure that the Lower Hunter Region can continue to grow in a sustainable way. It can enable appropriate development to proceed while preserving a finite and highly valuable environmental resource.

The principles of biodiversity planning adopted in the Plan are:

- to maintain and improve ecological processes and the dynamics of terrestrial ecosystems in their landscape context
- to maintain and improve viable examples of terrestrial ecosystems throughout their natural ranges
- to maintain and improve viable populations of the various biological organisms throughout their natural ranges
- to maintain and improve the genetic diversity of the living components of terrestrial ecosystems.

The key priorities for biodiversity planning in relation to improving or maintaining biodiversity values are:

- the first priority – to avoid losses to biodiversity and promote protection of biodiversity values *in situ*
- the second priority, where first priority is unachievable – to mitigate adverse impacts to biodiversity
- as a last resort, compensate for unavoidable losses to biodiversity.

2.4 Who should use this plan?

As this Plan is mainly focussed on urban development, it is primarily intended for use by the five council areas included within the LHRS area. Councils play a key role in biodiversity management, particularly through decision making in relation to land use planning and development assessment.

The plan is also likely to provide an important resource for those with business or decision-making roles and for those otherwise involved in the protection and management of biodiversity, including:

- Commonwealth and State government agencies, including the Hunter Central Rivers Catchment Management Authority (HCRCMA)

- the development industry
- land owners
- conservation and community groups
- scientists and researchers.

2.5 Land-use planning system context

The LHRS, accompanied by this RCP, is intended to guide local level strategic planning within the Lower Hunter. All new LEPs will be prepared in accordance with a direction made under Section 117 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Section 117 enables the Minister for Planning to direct the content of an LEP, including an outline of matters of environmental planning significance, that councils must consider when preparing the local provisions of their LEPs.

All five councils in the Lower Hunter will be required to prepare new LEPs within the next two to five years. These LEPs will contain the detailed zoning and development controls to guide development, and must be consistent with both the LHRS and the RCP. As discussed, the RCP will also provide the first significant step to achieving biodiversity certification in accordance with the TSC Act.

The RCP is also intended to guide biodiversity investment for restoration, repair and management, triggered by a variety of planning processes, such as local and state significant development, critical infrastructure projects and property vegetation planning. Mechanisms may include biobanking, property management and protective covenants (see Section 8). The RCP will also provide a useful guide to investment of Catchment Management Authority funding.

The RCP has been prepared to be consistent with a number of federal and state biodiversity strategies, including the *National Local Government Biodiversity Strategy* (Australian Local Government Association 1999), *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia 1996) and the *NSW Biodiversity Strategy* (NPWS 1999).

National Local Government Biodiversity Strategy

The *National Local Government Biodiversity Strategy* (Australian Local Government Association 1999) recognises that:

- conservation and sustainable use of our natural resources will only be achieved through local area planning and management, along with community education and participation
- there is a willingness of Local Government across Australia to play a lead role in dealing with our most pressing and complex conservation issues – the loss of biodiversity
- a clear and co-operative partnership agreement is required between the three spheres of government.

National Strategy for the Conservation of Australia's Biological Diversity

The *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia 1996) establishes goals, objectives and actions to ensure the effective conservation of Australia's biodiversity. It has been prepared in accordance with the requirements of the National Strategy for Ecologically Sustainable Development, and is intended to be implemented by Commonwealth, State and local governments.

NSW Biodiversity Strategy

The *NSW Biodiversity Strategy* (NPWS 1999) established a collaborative approach to biodiversity conservation. The Strategy proposes a framework for coordinating and integrating government and community efforts, ensuring that available resources are efficiently applied. The actions in the Strategy detail a balanced response for the integration of ecological, social and economic objectives.

2.6 Ongoing review of the Regional Conservation Plan

Similar to the LHRS, the RCP is to be comprehensively reviewed every five years. This is to ensure that progress toward the objectives of the RCP is monitored and any necessary revisions are made to ensure that the outcomes sought are realised. A key focus of the review will be to assess the extent to which the regional conservation priorities as identified in the *Biodiversity Investment Guide* have been conserved, the effectiveness of the offset mechanisms and the adequacy of the RCP's contribution to achieve an improve or maintain outcome.

Changes to the RCP are likely to occur in response to such things as improved biodiversity knowledge, improved biodiversity impact prediction skills, changing population trends and shifting development pressures.

3 Conservation Objectives

The overarching conservation goal for native vegetation in NSW under the *Native Vegetation Act 2003* is that biodiversity, and other environmental values of soil, water quality and salinity, must be 'improved or maintained'. This means that the gains for biodiversity must be greater than or equal to any losses resulting from clearing or other forms of degradation of native vegetation. This goal is also reflected in the *Threatened Species Conservation Act 1995* with regard to biodiversity certification. The Lower Hunter Regional Strategy sets a goal of improving or maintaining biodiversity in the region,

3.1 Conservation objectives for the Lower Hunter

DEC has established specific objectives for the Lower Hunter that, if achieved, will contribute to the 'improve' or maintain goal. In establishing objectives for the Lower Hunter, targets that had already been agreed to by the NSW Government were taken into account. The following criteria (commonly referred to as JANIS criteria) have been agreed by both NSW and Australian Governments (Commonwealth of Australia 1997).

These targets were used to guide significant land-use planning decisions, such as the government's forestry reforms. It is appropriate that the same targets are used to guide the development of a 25-year biodiversity investment strategy for the region.

JANIS Criteria

JANIS criteria are a set of biodiversity targets for forested environments agreed to by Australian states and territories and the Australian Government (Commonwealth of Australia 1997). These are:

- (a) Establishing a comprehensive, adequate and representative system of conservation reserves within forested lands.
- (b) Reserving of 15% of the pre-1750 distribution of each forest ecosystem. Where vegetation communities are recognised as vulnerable, then at least 60% of their remaining extent should be reserved.
- (c) All remaining occurrences of rare and endangered vegetation communities should be reserved or protected by other means as far as is practicable.
- (d) The reserve system should seek to maximise the area of high quality habitat for all known elements of biodiversity wherever practicable.
- (e) Where conservation goals cannot be met on public land through the formal reserve system, other mechanisms on private land may be required. For example, in fragmented landscapes, remnants that contribute to sampling the full range of biodiversity are vital parts of a forest reserve system. The areas should be identified and protected as part of the development of integrated regional conservation strategies.
- (f) Special features such as old growth forest and wilderness warrant special protection.

3.2 Targets for vegetation communities

JANIS establishes targets for vegetation communities, which have been applied to the Lower Hunter as follows:

- 1 A general principle of 15% reservation of the pre-1750 distribution of each forest ecosystem.
- 2 Where forest ecosystems are recognised as vulnerable, then at least 60% of their remaining extent should be reserved.

A vulnerable forest ecosystem is one which is:

- approaching a reduction in areal extent of 70% within a bioregional context and which remains subject to threatening processes, or
 - not depleted but subject to continuing and significant threatening processes which may reduce its extent.
- 3 All remaining occurrences of rare, endangered and vulnerable forest ecosystems should be reserved or protected by other means as far as is practicable. A rare ecosystem is one where its geographic distribution involves a total range of generally less than 10,000ha, a total area of generally less than 1,000 ha in the region or patch sizes of generally less than 100ha, where such patches do not aggregate to significant areas.

Lower Hunter Vegetation Communities listed as Endangered Ecological Communities under the *Threatened Species Conservation Act 1995* are classed under the JANIS definition of 'vulnerable' ecosystems and hence a reservation target has been set at 60% of their remaining extent within the region.

3.3 Features of special conservation significance

JANIS sets specific targets for old growth forests. Where old growth forest is rare or depleted (generally less than 10% of the extant distribution) within a forest ecosystem, all viable examples should be protected, wherever possible. For other vegetation communities, 60% of the old growth forest would be protected.

Other features have been identified as priorities for conservation in order to protect the full range of biodiversity in the region. Features of species conservation significance include old growth forest, identified wilderness, wetlands and landscapes which have undergone more than 70% clearing.

3.4 Fauna targets

One of the key biodiversity conservation objectives of JANIS is to "... *maintain viable populations of native forest species throughout their natural ranges*". This is to be achieved partly by ensuring that reserves are "... *large enough to sustain the viability, quality and integrity of populations*". These objectives are also reflected in the directions set for the National Reserve System (Commonwealth of Australia 2005), where "... *protected areas are selected and managed to maximise the probability of survival of their biota through ... being of sufficient size and condition to ensure long-term sustainability ...*".

During the Comprehensive Regional Assessment (CRA) of Lower North East NSW, the area required to support viable populations was estimated for forest fauna species of conservation significance. Of the 82 threatened species that are known or expected to occur in the Lower Hunter, viable habitat areas were estimated for 52 forest species. At present, viable populations are contained within conservation reserves for only 15% of these species.

Since the completion of the CRA, a number of reserve additions has improved this figure. However, it is still clear that the persistence of most threatened forest species cannot be guaranteed by the current reserve system alone. Furthermore, few areas outside the reserve system have any significant long-term protection and many are subject to ongoing degradation. A larger and more connected network of protected areas needs to be developed across the Lower Hunter.

3.5 Assigning relative conservation value

In order to simplify the many different features of conservation significance, areas were assigned a value of regional, state or local significance. This enables the conservation significance of different areas to be easily compared.

Each conservation value (for example old growth forest or under target ecosystems) was assigned the value of local, regional or state significance. Each area in the landscape was

then classified as being of local, regional or state significance depending on the highest level of significance present in that area. For example, if an area contained features of local and state significance it would be classed as state significant.

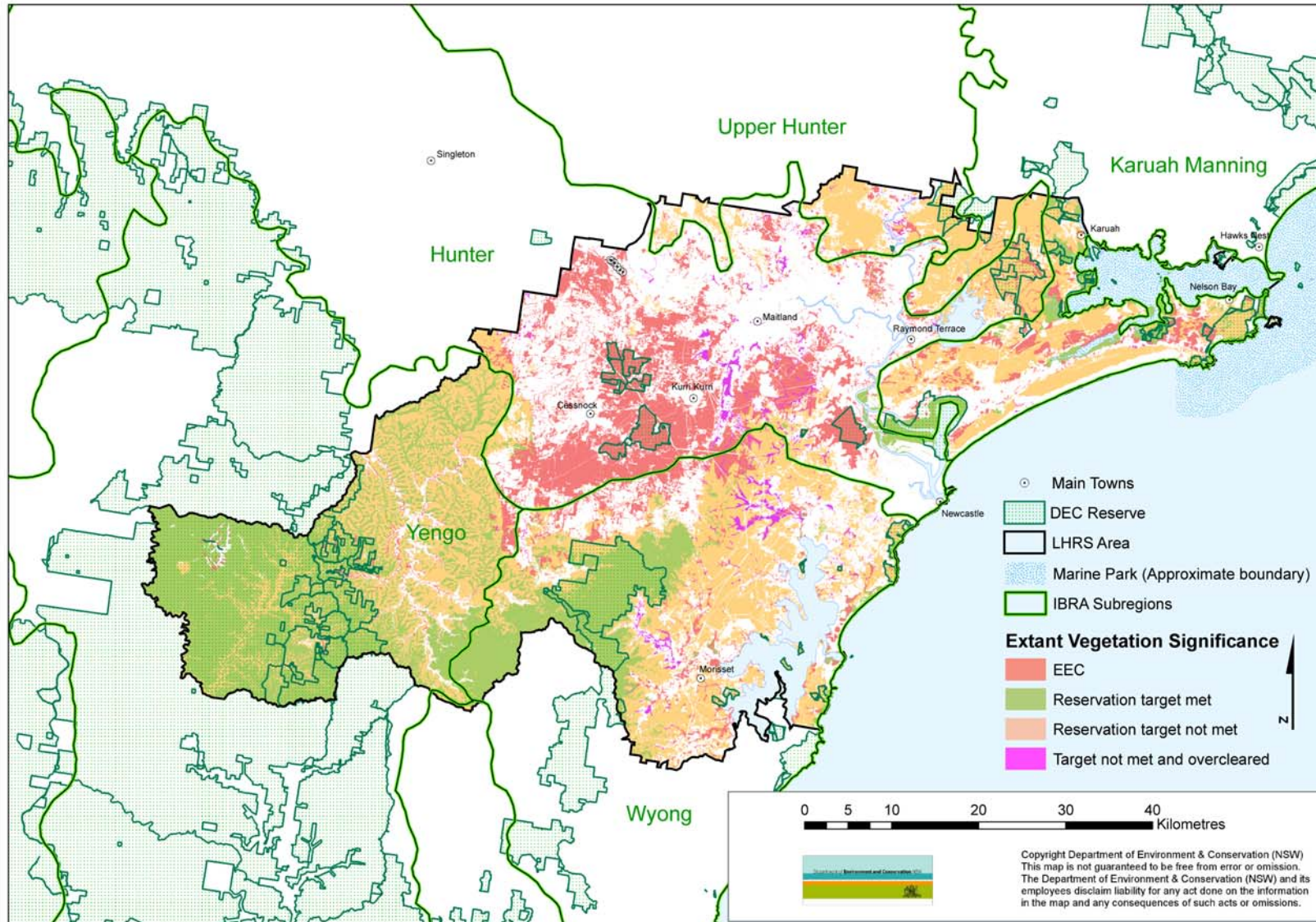
3.6 Reserve design

While areal targets provide a useful means of quantifying conservation goals, conservation efforts must have an overall aim to achieve the continued viability of biodiversity. Strategic reserve design is integral to sustaining biodiversity in the region.

DEC applied reserve design principles proposed by the Australian Government (Commonwealth 2005), in developing the RCP. These design principles recommend reserves be:

- set in a landscape context with strong ecological integrity
- selected to ensure that a 'core' area is protected with an effective buffer and the provision of adequate connectivity (i.e. linkages/corridors) to other protected areas, or other areas which are managed sustainable for their natural resources
- of sufficient extent to ensure that ecological functioning and species composition will be maintained
- should be of a condition which will enable long-term sustainability and which will optimise opportunities for species dispersal.

Map 1: Conservation Status of Vegetation Communities in the Lower Hunter



4 Conservation Assessment

4.1 Biodiversity values of the Lower Hunter

4.1.1 Regional overview

The Lower Hunter Region is dominated by valley floors which are fringed in the south-west and north-east by the ranges of Cessnock and Maitland local government areas (LGAs). The coast contains the expansive lake system of Lake Macquarie, the mouth of the Hunter River at Newcastle and the extensive dune systems and estuary of Port Stephens. This region covers approximately 430,000 hectares of which roughly 60% or 264,000 hectares is vegetated. The Lower Hunter region contains significant wetland areas including estuaries that are of significance for migratory shorebirds, and one of the largest coastal saltwater lakes in the southern hemisphere. This region supports one of the three largest river valley systems in eastern NSW and includes wetlands of international national significance.

The region is of biogeographic and scientific significance as it supports a transition between the northern and southern ecological communities. It also forms an east-west migratory pathway and a drought refuge for inland species.

The native vegetation that remains within the Lower Hunter provides habitat for a great diversity of wildlife including many threatened species. The region contributes to a vegetated backdrop of considerable scenic amenity to the coastline and the city of Newcastle.

4.1.2 Vegetation

The majority of the Lower Hunter region lies within the Hunter catchment. The catchment supports a unique mix of native vegetation including a rich assemblage of plant species that are characteristic of coasts, mountains, semi-arid areas and sandstone outcrops. Numerous plant species that occur in the Hunter Catchment are at the limit of their known distribution. This variety occurs, in part, because there is no abrupt escarpment separating the vegetation on the western slopes from that on the coastal fringe. This has resulted in a substantial mixing of coastal and inland flora. In contrast, other large coastal catchments in NSW are separated from the western slopes by escarpments and plateau of the Great Dividing Range.

The Lower Hunter region is part of a transition zone for many plant and animal species between the sub-tropical influences of the north and the cooler, less fertile conditions to the south. As a consequence, the vegetation is unique when compared to the neighbouring regions. The flora of the Hunter Valley floor is remarkably diverse, with approximately 2,000 species of vascular plants.

Of the 61 vegetation communities that occur in the Lower Hunter, 19 communities are considered to be regionally significant including ten listed endangered ecological communities (EECs), (DEC unpublished). The Lower Hunter Region currently has 26 threatened plant species including eight endangered and 18 vulnerable species.

4.1.3 Major ecosystems

Wetlands

The Lower Hunter contains some of the most significant wetlands in NSW. The wetland habitats of the Hunter River estuary, Lake Macquarie and Port Stephens, as well as the habitat corridor from the Watagans Range to Port Stephens, are of exceptional conservation significance.

The Hunter estuary wetlands are listed internationally under the Ramsar Convention because of their unique mix of wetland types, importance for maintaining biological diversity and conservation of migratory shorebirds (including regularly supporting part of the East Asian–Australasian Flyway population of Eastern Curlew). It supports a large number of species at a critical seasonal stage of their breeding cycle and provides a key refuge during inland drought for species such as Freckled Duck, Pink-eared Duck, Australian Pelican and Glossy Ibis. The Hunter estuary provides important nursery habitat (spawning grounds) for marine organisms including commercial species of fish and prawns (DPI 2004).

The Hunter estuary contains the second largest area of mangroves in NSW. It is important as both a feeding and roosting site for a large seasonal population of shorebirds and as a waylay site for transient migrants. An estimated 4,800 migratory shorebirds were recorded in the Hunter estuary in 2000 and the 38 species of migratory birds recorded at Kooragang Nature Reserve have been listed under the Japan–Australia and China–Australia Migratory Birds agreements. It is important habitat for threatened waterbirds and amphibians, including the endangered Black-necked Stork and Green and Golden Bell Frog.

The Port Stephens estuary supports 22 migratory and ten breeding shorebird species. Approximately 2,000 shorebirds and even higher numbers of other waterbirds occur in the estuary, with the area particularly important all year round for larger species of shorebirds. Two endangered and eight vulnerable shorebird species listed under the TSC Act have been recorded from Port Stephens. Lake Macquarie is one of the largest coastal saltwater lakes in the southern hemisphere.

Over 3,500 hectares of wetlands either adjacent to or in the vicinity of the Port Stephens estuary are also listed under State Environmental Planning Policy 14 – Coastal Wetlands.

Dry forest and woodlands

The Lower Hunter contains significant areas of dry forest and woodland, comprised of a range of vegetation communities dominated by Blackbutt, Grey Gum, Forest Red Gum, Ironbark, Rough-barked Apple, Scribbly Gum, Smooth-barked Apple, Spotted Gum and Turpentine. The dry forest/woodland fauna have strong affinities with the fauna of the western slopes and the Lower Hunter is thought to act as a refuge during times of inland drought. The enhancement of east–west habitat linkages is important for these species. Indeed, most of the habitat linkages throughout the Lower Hunter lowlands are of greatest functional importance for the dry forest fauna owing to the widespread (although fragmented) occurrence of these species.

Lowland dry forest and woodland are very poorly conserved in the Lower Hunter and are under the most threat from development. These habitats are important for the conservation of threatened woodland birds (eg, Black-chinned Honeyeater, Brown Treecreeper, Speckled Warbler), nocturnal birds (eg, Powerful Owl, Barking Owl, Masked Owl), arboreal mammals (e.g. Brush-tailed Phascogale, Koala, Squirrel Glider) and bats (e.g. Grey-headed Flying-fox, Little Bentwing-bat, Eastern Freetail-bat, Greater Broad-nosed Bat). The Lower Hunter Spotted Gum-Ironbark Forests within the Cessnock-Kurri Kurri area are of state significance for the nationally endangered Swift Parrot. The Squirrel Glider population in the Lower Hunter is of state significance as the area supports extensive, high quality coastal habitat. The woodlands of the Tomago/Port Stephens area support an iconic population of the Koala.

Heath

The extensive heathlands of the Lower Hunter (such as the heaths on the Tomago Sandbeds and around Port Stephens) are among the most significant heath habitats in NSW. The heaths offer a number of important habitat resources. For example, they form a very significant nectar resource, important for a wide range of nectarivorous species, including the threatened Grey-headed Flying-fox and Squirrel Glider (in heathy woodlands), as well as a significant number of avian honeyeaters. They also supply dense cover that is utilised by a number of species, including the threatened Spotted-tailed Quoll. The wet heaths are habitat for threatened species such as the Wallum Froglet.

Swamp forest

Swamp forests occur on the Lower Hunter lowlands. These swamp forests are highly important habitat, with Swamp Mahogany and Paperbark being important nectar sources at key times of the year for threatened species such as the Grey-headed Flying-fox and Swift Parrot, while Swamp Mahogany is a particularly important Koala food tree.

Moist forest/rainforest

The moist forests in the Lower Hunter are found predominantly in the Watagans Ranges and elsewhere in sheltered gullies. They range from rainforest to wet Blue Gum, Turpentine and

Spotted Gum forests. An important group of fauna is dependent on this habitat, including threatened species such as the Giant Barred Frog, Stuttering Frog, Wompoo Pigeon, Sooty Owl and Stephen's Banded Snake.

4.1.4 Fauna

The Lower Hunter contains fauna habitats of national and international significance. The Hunter Valley marks a transition zone for many fauna species between the sub-tropical influences of the north and the cooler, less fertile conditions to the south. There is a wide array of fauna habitats in the Lower Hunter that are known, or are likely, to support 81 threatened species, including 11 endangered species.

4.2 Conservation status of the Lower Hunter

4.2.1 Overview

Vegetation communities have been used within this RCP as an indicator, or surrogate, of species distribution and diversity across the Lower Hunter region.

Two thirds of the Lower Hunter remains vegetated and while the large majority of this vegetation is restricted to the slopes and ranges, some large vegetated areas still remain on the valley floor where clearing has been most extensive. Historically, much of the uncleared land on the valley floor has been either Government owned (such as State Forest or Crown Lands managed by Hunter Water Corporation) or owned by mining companies for extractive purposes. Vegetation on the valley floor outside of these core areas is highly fragmented. These small remnants are highly vulnerable to edge effects such as increases in weeds and introduced predators, increase in levels of nutrients, grazing, altered fire regimes and altered drainage. Fauna may also be impacted by changes to the microclimate, an increase in extreme temperatures, an increase in wind and wind damage and genetic isolation.

An example of a highly fragmented community at risk in the Hunter Valley is the Lower Hunter Spotted Gum-Ironbark EEC. This is the third most extensively distributed community within the Lower Hunter Region with approximately 32,000 hectares still remaining. However current vegetation mapping indicates that this community occurs as 4,800 fragments, the majority of which are less than 10 hectares in area.

Of the 61 vegetation communities that occur in the Lower Hunter, over half have not met reservation targets in the current reserve system. Of these inadequately reserved vegetation communities, seven have negligible or no representation within formal reserves across the Lower Hunter. None of the EECs are adequately reserved (under JANIS targets). Wetland vegetation communities are some of the most poorly conserved and at risk. For example, Swamp Mahogany – Paperbark Forest has only 3% of its pre-1750 distribution within reserves in the Lower Hunter.

The fauna of the Hunter Valley has suffered from the large-scale removal of native vegetation. Many forest and woodland dwelling species are now uncommon on the valley floor and are largely confined to the slopes and rugged areas where there have been fewer disturbances.

One of the most significant areas of remaining vegetation is the Mount Sugarloaf to Port Stephens corridor, which provides a vegetated link through the 'Tank Paddock' from the sandstone mountains down through the foothills to the coastal plain. This is one of only a few remaining vegetated links between the Great Dividing Range and the east coast. This corridor is highly significant and allows for fauna movement such as seasonal migration and juvenile dispersal.

4.2.2 Regional analysis

The Lower Hunter area can be divided into a number of regions and subregions, each with its own characteristics of climate, lithology/geology, landform, vegetation, flora and fauna. The *Interim Biogeographic Regionalisation for Australia* (IBRA) (Environment Australia 2000) provides an overview of landscape patterns across the Lower Hunter Region. IBRA subregions provide a useful set of boundaries for understanding patterns of clearing and other

threats to biodiversity, and are used in this RCP to provide an overview of conservation status and to guide conservation efforts.

The Lower Hunter Region can be broadly broken into five land systems using the IBRA sub-regions classification: the Upper Hunter and Karuah-Manning are more characteristic of environments on the north coast while the Yengo, Hunter (lower) and Wyong subregions have greater similarities to other parts of the Sydney basin (refer to Map 1).

Environmental threats vary between subregions and include degradation of native vegetation and wetlands, development, extraction of natural resources, weeds and pests, extraction of river and ground water, barriers to fish migration, and recreation (Hunter–Central Rivers Catchment Management Authority 2006). The land systems in the Lower Hunter and the major threats in each are described below.

Yengo

This subregion is comprised of the Narrabeen and Hawkesbury sandstone ranges that occupy the south–western portion of the Lower Hunter. Yengo National Park, Corrabare State Forest and Pokolbin State Forest are major features of this sub-region. This is the most intact of the subregions that occur in the Lower Hunter and only 9% of the area has been cleared. However, this region has a high proportion of State Forest and privately owned forested land that has been subjected to selective logging for timber production and management for pit prop production to support the local mining industry.

Hunter

This subregion occupies one third of the study area. This is a largely cleared, farmed and mined landscape of the Hunter Valley floor but also includes some forested areas to the west of Port Stephens (Medowie State Forest, Medowie State Conservation Area and Wallaroo State Forest) and Grahamstown Dam. Almost 80% of this subregion has been cleared and only 4% is within conservation reserves. Major threats include continued fragmentation and further degradation of vegetation remnants.

The Hunter Valley Lowlands have been subject to the greatest extent of clearing in the subregion and support a number of EECs. The River-Flat Eucalypt Forest on Coastal Floodplains in particular have undergone extensive clearing. Other EECs in this region include:

- Lower Hunter Spotted Gum – Ironbark Forest
- Kurri Sand Swamp Woodland
- River-Flat Eucalypt Forest on Coastal Floodplains
- Quorrobolong Scribbly Gum Woodland
- Hunter Lowland Redgum Forest in the Sydney Basin Bioregion.

The Hunter Valley lowlands continue to be subject to high levels of threat from clearing, logging and other forms of degradation. The fauna species found in lowland forests are therefore particularly vulnerable.

Wyong

The Wyong subregion incorporates the coast and hinterland south of the Hunter River including Lake Macquarie, the Watagan Ranges and coastal forests and heath. This subregion is relatively intact with less than 30% of its area cleared. Almost 12% of the subregion is within reserves. The vegetation of the Wyong sub-region is under major threat from land clearing for new developments, degradation from fragmentation and isolation, and competition from weeds.

Karuah Manning

The Karuah Manning subregion is largely comprised of Coastal Barrier Sands, estuarine plains and alluvial deposits. This region supports large areas of significant wetlands, coastal sand heaths and woodland from Fullerton Cove north to Port Stephens. Over half of this

subregion has been cleared. A number of EECs occur within the Wyong and Karuah-Manning sub-regions, which reflect the pressure placed on the remaining vegetation. These EECs include:

- Swamp Sclerophyll Forest on Coastal Floodplains
- Freshwater Wetlands on Coastal Floodplains
- River-Flat Eucalypt Forest on Coastal Floodplains
- Littoral Rainforest
- Swamp Oak Floodplain Forest
- Coastal Saltmarsh of the NSW North Coast, Sydney Basin and South East Corner Bioregions.

Upper Hunter

Although the Upper Hunter sub-region is largely cleared for agriculture and grazing, the relatively small intrusion of this sub-region into the Lower Hunter Regional Strategy area is in relatively good condition with Wallaroo National Park and Wallaroo State Forest occupying a large portion of the eastern occurrence. These are significant reserves for this subregion which has less than 1% reserved. The Williams River, the Allyn River and the Paterson River are major features of this sub-region, forming north-south valley systems.

4.3 Threats to the biodiversity of the Lower Hunter

Australia has a record of having the highest rate of species extinction of any country in modern history, mainly due to land clearing, water harvesting, and the introduction of rabbits and foxes (Glaznig 1995).

The primary cause of future biodiversity loss within the Lower Hunter is likely to be development and economic activity, and the consequential change in land use and form (Fallding 2004) from the following activities associated with this type of land use:

- clearing of native vegetation
- land filling and earthworks
- weeds and feral animals
- roads and traffic
- bush fire management, such as the creation of asset protection zones, fire trails, and understorey thinning
- agricultural activities, such as cropping, viticulture and livestock grazing
- pollution and land contamination, including salinity
- changes to hydrological regimes
- soil erosion and sedimentation
- rubbish dumping.

Approximately 1,500 hectares of vegetation has been cleared within the Lower Hunter in the past five years (based on Spot satellite imagery interrogation), with approximately 35% of the Lower Hunter being substantially cleared of native vegetation. Of the 65% of vegetation remaining, much has been affected by activities such as forestry, agriculture, weed encroachment and human settlement. The implications of historical land use practices on biodiversity within the Lower Hunter have been significant, and the effects of these practices are unlikely to be fully realised for many decades. For example, small isolated fragments of native vegetation may not be viable in the long term: having a greater boundary in proportion to their area makes these patches more vulnerable to stochastic events such as fire, and to edge effects such as weed invasion.

Map 1 illustrates vegetation communities in the Lower Hunter and their conservation status as measured by JANIS comprehensiveness targets.

5 Potential Impacts of the Regional Strategy

5.1 Potential biodiversity impacts of the regional strategy

A major role of the Lower Hunter Regional Strategy is to focus and constrain the development footprint across the landscape. The Strategy directs residential and employment development into selected areas to accommodate the projected growth of the region over the next 25 years.

Areas of high biodiversity value and other planning constraints were considered by the Department of Planning when identifying the proposed development areas for the LHRS. However, in some areas, it was determined that social and economic considerations outweigh biodiversity considerations and, as a result, some of the proposed development areas include high conservation values. In addition, previous land use decisions have resulted in areas of high biodiversity value being zoned for development.

The analysis of biodiversity impacts in this RCP is limited to the development areas, which are able to be mapped at this time. These areas are the proposed development scenarios in the LHRS and the areas currently zoned for development but which are not currently developed.

The following categories of development are likely to result in biodiversity impacts but cannot be mapped with any accuracy, therefore no impact analysis has been undertaken for these developments in this RCP:

- infrastructure requirements that emerge as a consequence of or in support of planned growth
- other major development projects that cannot be accommodated within planned employment lands, such as mining activities and associated infrastructure
- potential for development of additional greenfield release areas via the Sustainability Criteria.

The biodiversity impacts associated with the categories of development not considered in this RCP will need to be assessed and offset through other mechanisms, including bio banking (see Section 8). This may be done on a case-by-case basis, often at the time of rezoning or at proposed development stage.

It is highlighted that the data presented in this section assumes that 100% of the existing vegetation on the proposed development sites will be cleared. It is noted that some vegetation will be retained in various forms including riparian buffers and open space areas. However, it is difficult to estimate the level of vegetation that will be retained on these sites. In addition, it is noted that the biodiversity value of any residual vegetation will be significantly eroded through fragmentation effects including weed infestation, erosion and track formation.

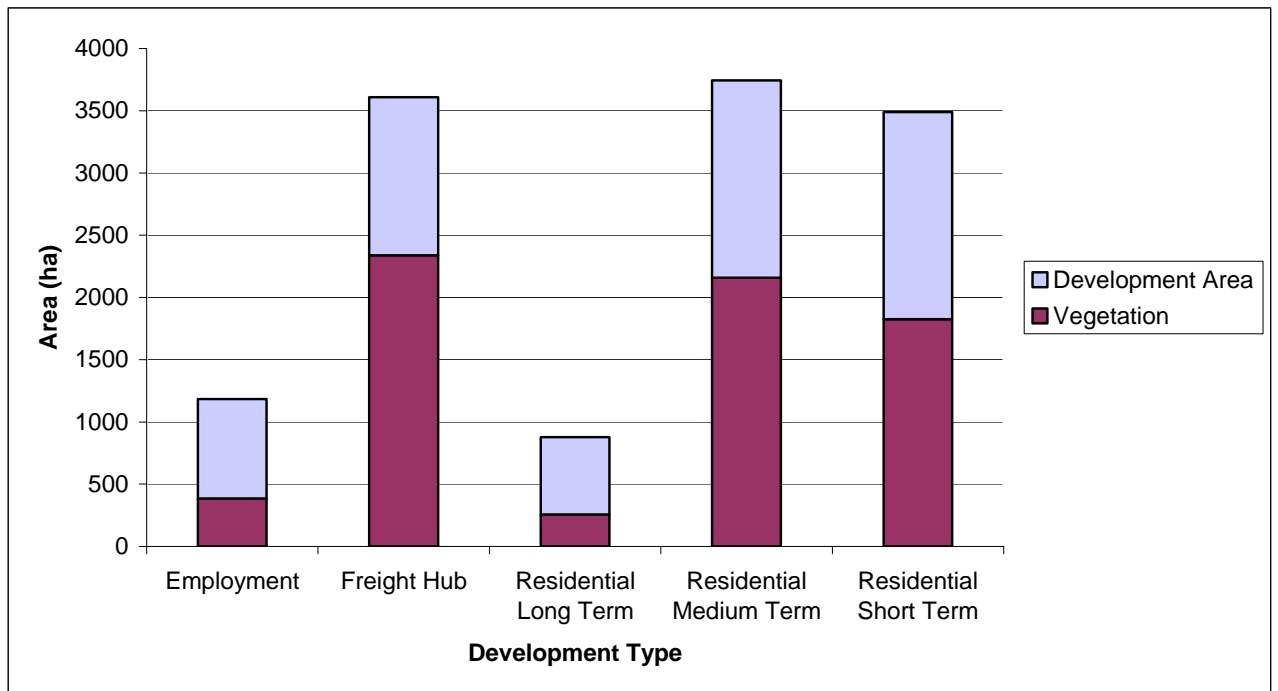
It is noted that the Department of Planning has adopted slightly different assumptions in calculating the expected extent of vegetation loss. Both agencies acknowledge that at this stage it is not possible to accurately determine the exact extent of vegetation loss and that the figure and the associated offsets required will need to be reviewed throughout the implementation process.

5.2 Potential biodiversity impact of the LHRS development scenarios

The proposed LHRS development consists of 34 development scenarios covering approximately 12,900 ha of land. The area of vegetation within each development type is described in Figure 2. An estimated 4,000 to 5,000 ha of native vegetation will be potentially affected by the proposed development. It is noted that an additional 2,300 ha of vegetation occurs on the freight hub site and it is unclear at this point how much of this site will be cleared. A structure planning process will resolve this issue and identify substantial areas for conservation.

More than half of all vegetation within the development proposals occurs within proposed residential zoning.

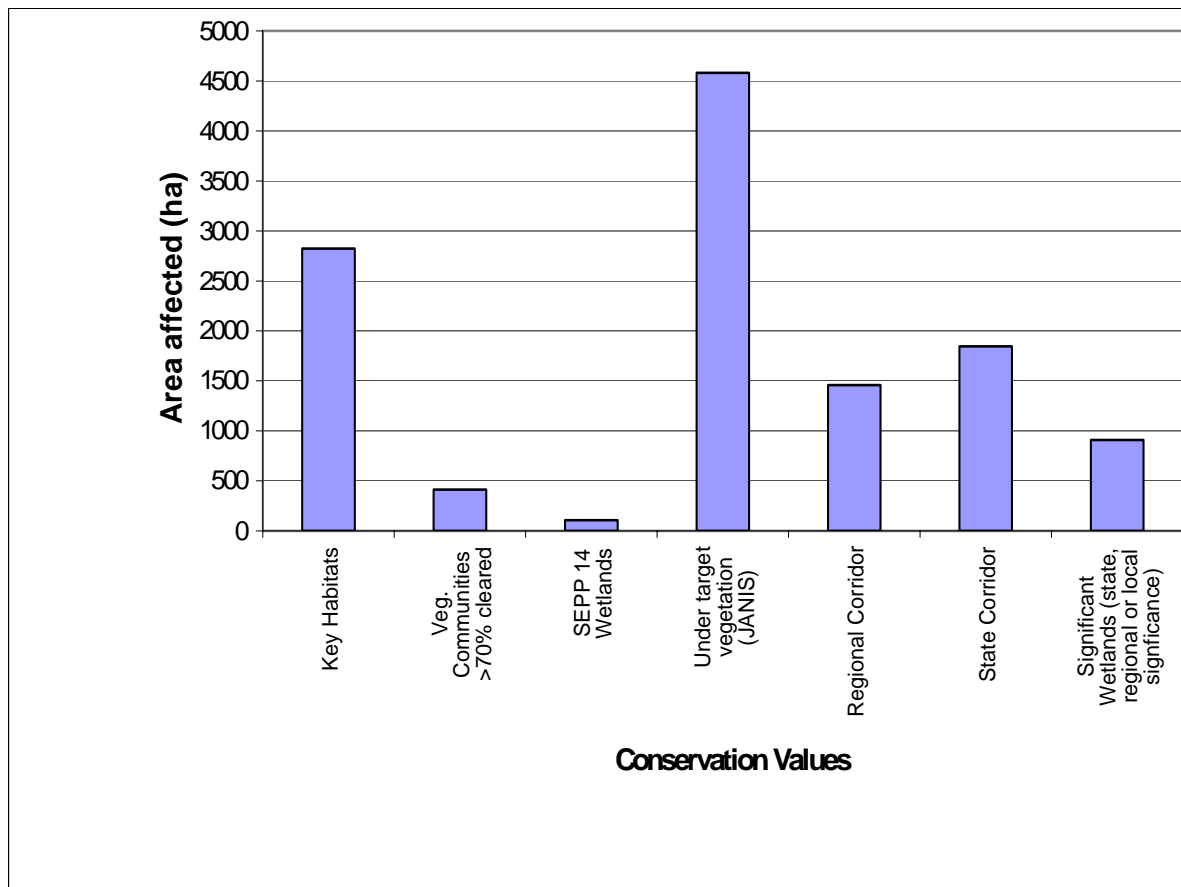
Figure 2: Native vegetation within the LHRS proposed development areas



Note: At this stage it is unclear how much clearing is likely to occur on the freight hub site. A structure planning process will be used to define development and conservation areas. Figures shown represent all vegetation onsite.

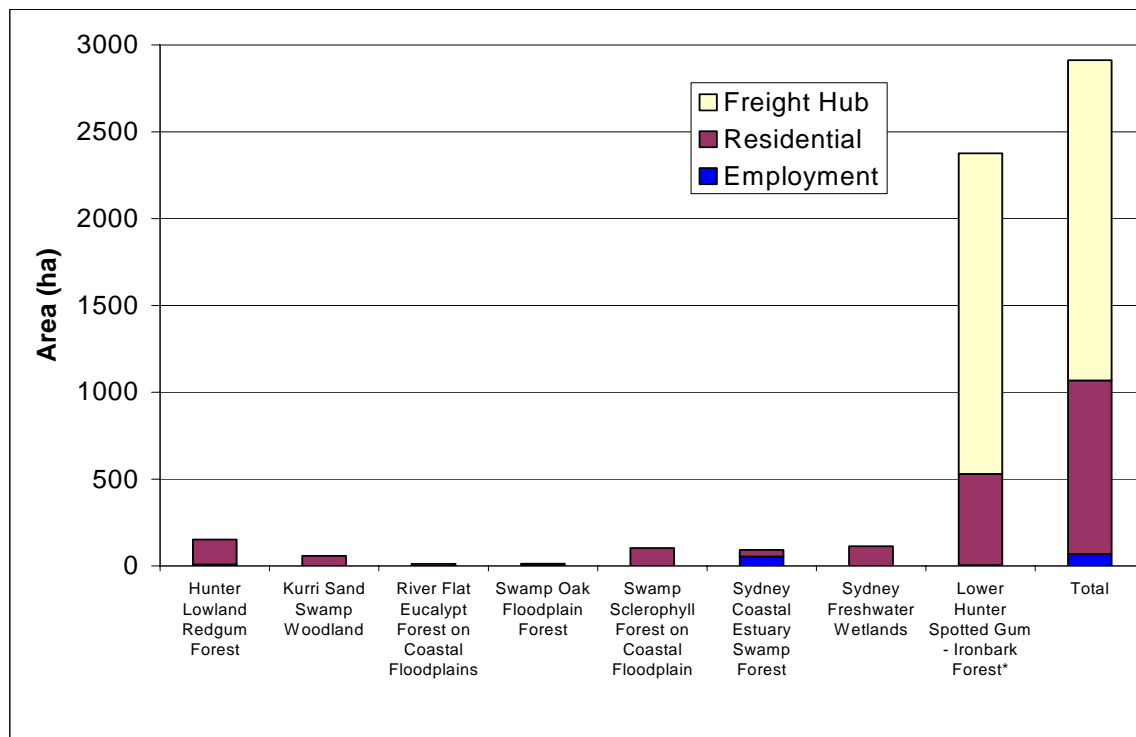
The conservation values that occur within the development scenarios and which are therefore vulnerable to degradation and destruction are described in Figure 3. Note that a single area may have multiple conservation values; for example a regionally significant wetland may also be a key habitat. The features most affected in terms of total area within the development scenarios are EECs and vegetation communities not adequately represented in the reserve system (labelled as under-target vegetation communities (JANIS) in Figure 3).

Figure 3: Area (ha) of each conservation value within proposed development areas



A breakdown of the area of EECs within the development scenarios is provided in Figure 4. Industrial land poses the greatest threat to EECs. The largest single area of EEC (Lower Hunter Spotted Gum Ironbark Forest) falls within the proposed industrial hub at Beresford and this development accounts for 635 ha of affected EEC. Lower Hunter Spotted Gum Ironbark is the most affected EEC. Over 150 ha of this vegetation community occurs within the proposed residential development in East Maitland. Approximately 190 ha of Hunter Lowland Redgum Forest falls within proposed residential areas, much of this occurring north-west and south of Rutherford.

Figure 4: Area of Endangered Ecological Communities affected by the Development Proposals



Note: The majority of the Lower Hunter Spotted Gum Ironbark impact is associated with the Freight Hub site [refer Figure 2]

5.3 Potential biodiversity impacts in areas currently zoned for development

There are significant areas in the Lower Hunter which are currently zoned for development but which have not been identified as development lands in the LHRS. Figure 5 provides a summary of the zoning of these lands and the vegetation they contain. The areas fall into two categories:

1. Lands which are already zoned for development and for which development is expected but has not yet occurred (or occurred only in part). These 1 lands would be the highest risk of all zoned land in terms of vegetation loss because of development (1,960ha).
2. Areas zoned for development and which have been developed but which retain some native vegetation (7.080ha).

Note that within areas zoned for development but not yet developed, not all the native vegetation will necessarily be cleared: vegetation may be retained as part of landscape planning (such as roadside vegetation) and other areas may be subject to building constraints.

Vegetation remnants within areas which have already been developed include roadside vegetation, small patches within urban areas, streamside reserves and commercial and industrial buffer land. It is expected that the majority of this vegetation will persist but is likely to be degraded to some extent through the planning period. Isolated patches of vegetation within urban landscapes are subject to degradation through physical disturbances, weed invasion and other edge effects as described in section 4. The value of these areas for fauna is frequently reduced due to their size and isolation from larger patches of habitat, the presence of feral animals and loss or alteration of essential habitat components such as tree

hollows or understorey. Therefore the biodiversity value of these residual areas is severely diminished.

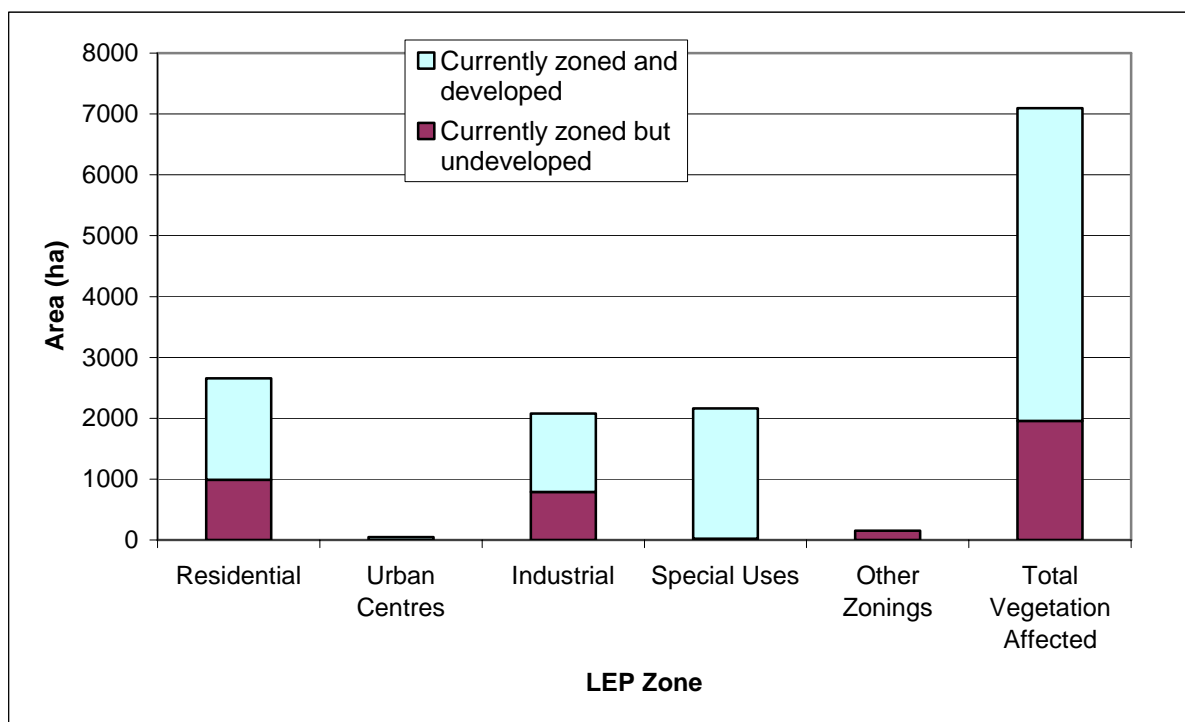
There are a number of large and significant parcels of vegetated land zoned for development outside the strategy which are worthy of note. They include the following:

- Residential-zoned land in Western Lake Macquarie (Booragul) and North Stockton Beach (Fern Bay).
- Undeveloped industrial-zoned land which includes two large mining areas (Eraring, Doyalson) and industrial lands at Kurri Kurri.
- Infrastructure land which includes roadside reserves, Williamtown Airport, Newcastle University grounds and waste treatment works.

Figure 5 provides a summary of the extent of native vegetation on land currently zoned for development (both developed and undeveloped), in the Lower Hunter.

Zones considered to be development zones are 2 (Residential), 3 (Urban centres), 4 (Industrial), 5 (Infrastructure) and Lake Macquarie 10a (Investigation for development). These figures exclude the Australian Defence Force (ADF) land to the north east of Medowie (Bombing Range) which is under no immediate threat of development and is expected to remain in its current condition through this planning period. This ADF land is approximately 2,600 hectares in size.

Figure 5: Area of Native Vegetation within lands currently zoned for development but not included in the Lower Hunter Regional Strategy



Note: The figures shown indicate total possible vegetation loss. While it is expected that these lands will be developed in the future, the actual area to be cleared will ultimately be subject to site-specific constraints and planning considerations.

6 Biodiversity Investment Guide

6.1 Purpose of the guide

The purpose of the biodiversity investment guide is to identify strategic regional conservation priorities to maximise the conservation of biodiversity in the Lower Hunter with the resources available. The intent is to focus on those areas most important for conservation, rather than passively reacting to development pressures.

DEC has identified two categories of priorities:

1. Candidate areas for future reservation and management by the DEC, including public and currently freehold lands suitable for inclusion in the DEC reserve system.
2. Other regional conservation priorities, which could be protected via a range of conservation mechanisms by both private and public landholders.

Together, these priorities form the basis of the 25-year biodiversity investment guide for the Lower Hunter.

If the areas identified are conserved in accordance with the mechanisms outlined in Section 8, these offsets will make a significant contribution to achieving a maintain or improve outcome, in response to the development scenarios identified in the LHRS.

6.2 A 25-year investment strategy

Formal reservation of natural areas (such as the creation of national parks or nature reserves) is widely recognised as the most secure and effective means of protection of biodiversity (Rodrigues et al. 2004). This is reflected in NSW policy and legislation, and national and international policy.

In order to be effective, a reserve system needs to protect the range of biodiversity present in any given region. This usually requires an analysis of regional conservation values and strategic targeting of reserves: opportunistic creation of reserves as a result of unrelated land use decisions may result in a highly biased reserve system which over-represents some natural values and misses others altogether.

The 25-year investment strategy relies on formal reservation as the primary conservation mechanism in the Lower Hunter. The strategy also recommends complementary conservation measures which are less secure but nevertheless essential to providing conservation of biodiversity across the region.

The principles guiding the development of the 25-year investment strategy have been taken from State and Commonwealth Government policies for building a Comprehensive, Adequate and Representative reserve system, specifically the JANIS and National Reserve System principles. JANIS targets have been adopted to guide the selection of reserves so that, in the future, the reserve system may protect the range of biodiversity in the region. The National Reserve System principles have been applied to increase the chances of these reserves being viable in the long term.

The 25-year investment strategy utilises the following conservation mechanisms:

- ***New DEC reserve proposals:*** major contiguous areas of high conservation value vegetation. These areas would be suitable for a system of national parks, nature reserves and/or state conservation areas, that could form the secure core or 'backbone' of the biodiversity investment strategy. The proposed reserves are large, well connected and contain a range of ecological communities in moderate to high condition. Core areas on public land will provide a focus for the addition of conservation areas elsewhere in the region. The proposed reserves are shown on Map 2.
- ***Other regional conservation priorities:*** smaller or more dispersed areas of high conservation value elsewhere in the landscape. Conserving these 'other regional conservation priorities' will be critical, if an overall outcome that improves or maintains

biodiversity is to be achieved. In these areas a range of conservation mechanisms may be appropriate, such as biobanking, conservation agreements, management of weeds and feral animals, enhancement of riparian vegetation or formal reservation. These investment areas are shown on Map 3.

6.3 New reserve proposals

Within the Lower Hunter Valley there are two long-standing proposals for new conservation reserves and two more recent proposals, all of which have had strong community support for a number of years. DEC's analysis confirmed these areas as the regional conservation priorities, which have been incorporated in the 25-year strategy.

The most significant of these is the Watagan Ranges to Port Stephens proposal, which provides a highly significant link between southern sandstone ranges and the coastal heaths and wetlands of Port Stephens. Corridors are a major theme in the new reserve proposals, as they enable a range of benefits for biodiversity such as access to critical resources, genetic exchange between individuals of the same species and dispersal of juveniles.

A South Wallarah Peninsula conservation area will build on and extend the conservation values of Wallarah National Park and provide protection for EECs and the threatened plant *Tetratheca juncea*, as well as protecting some of the foreshore of Lake Macquarie and the coastal shore. This reserve will also create a coastal corridor connection linking Wallarah National Park and Munmorah State Conservation Area and provide a green buffer between Newcastle and the Central Coast.

A proposed Port Stephens reserve (additions to Karuah Nature Reserve and Worimi Nature Reserve) will protect important Paperbark Swamp forests, SEPP 14 wetlands, foreshores of Port Stephens and habitat for threatened species, including migratory species.

A Werakata extension (near Cessnock) will significantly expand the existing area of reserve and will conserve significant areas of endangered ecological communities including Lower Hunter Spotted Gum Ironbark and Forest Redgum.

A final key priority is securing some viable areas of endangered and under-reserved Valley floor ecosystems.

The land identified as the basis for the new reserves is predominantly public land, which the Government is now committed to transferring as Stage 1 of implementing this Plan. 20,000 hectares will be transferred under this new commitment. The majority will be transferred to conservation reserves under the *National Parks and Wildlife Act 1974*, with a smaller balance to be reclassified from operational forest to flora reserve under the *Forestry Act 1916*.

A number of private landholdings are also suitable for addition to the reserve system; however, they may only be acquired where landholders are willing to sell. Substantial funds would also be required usually to acquire such lands.

In response to submissions received on the LHRS the Government has entered into negotiations with several major landholders to refine potential development and conservation outcomes for their lands. As a result of these negotiations, legally enforceable agreements are being entered into to transfer 12,000 ha of privately owned lands to the Minister for the Environment for incorporation into the reserve system, at no cost, in exchange for appropriate development rights.

The areas to be transferred include extensive areas of high conservation value land, which is strategically located. Several of the areas to be transferred into the reserve system are critical to the establishment of the corridors identified as regional conservation priorities (i.e. Watagans to Port Stephens and South Wallarah) and are adjacent to the areas of public land to be transferred. The combination of public and private land will make a significant contribution to the proposed corridors.

DEC has assessed all of the major landholder 'packages' and finds that each will make a positive contribution to the attainment of the strategy's overall 'improve or maintain goal'.

Over the life of the Plan, DEC will be looking at opportunities to add to these important new reserves, improving reservation targets and connectivity across the landscape.

6.3.1 Conservation values of the reserves

The creation of the proposed reserves will contribute towards most JANIS targets and will result in the reservation targets for some vegetation communities being met. The key factor in developing the new reserve proposals was conservation values. However, level of existing threat, patch size, connectivity and the presence of public lands to form the core of reserves were also crucial considerations. Consequently, substantial areas of high conservation value lie outside the new reserve proposals. The proposed reserves will need to be complemented by protection of some of these additional areas before all JANIS targets can be met.

Major benefits of the new reserve proposals include:

- potential increase in the reservation of 59 of the 61 vegetation communities present in the region
- provision of habitat for 75 of the 104 priority fauna species known from the Lower Hunter
- reservation of a significant area of mapped EECs
- expansion of the nationally significant freshwater wetlands of Hexham Swamp Nature Reserve
- further reservation of the internationally significant and Ramsar-listed Kooragang wetlands
- protection of large areas of important estuarine wetlands around Port Stephens.

Figure 6 illustrates the extent to which conservation values are currently represented in the reserve system and the potential contribution that the new reserve proposals will make to their protection.

Figure 7 provides an overview of the degree to which EECs are protected under existing reserves in the region and the degree to which the new reserves would contribute to their protection.

Figure 6: Percentage of the total area of conservation values (based on JANIS criteria) in LHR and their representation in existing and proposed reserves

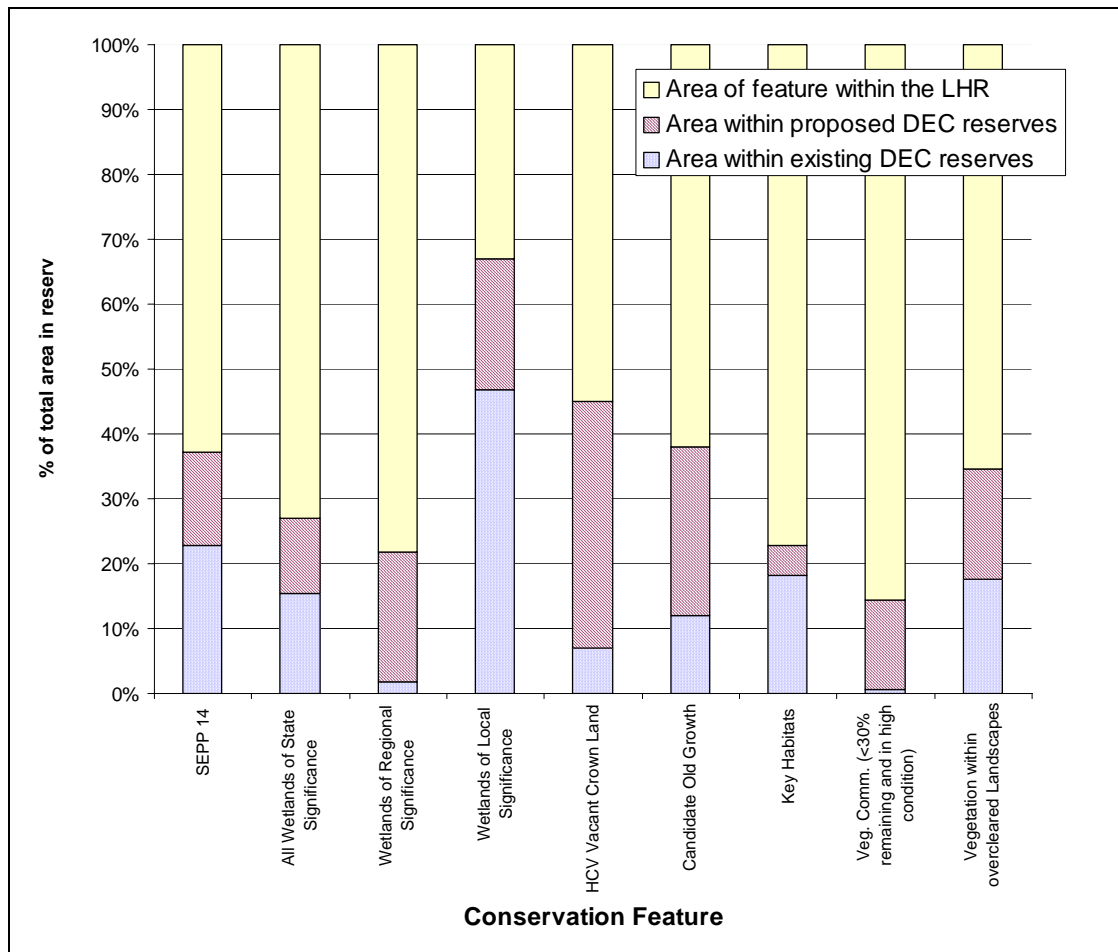
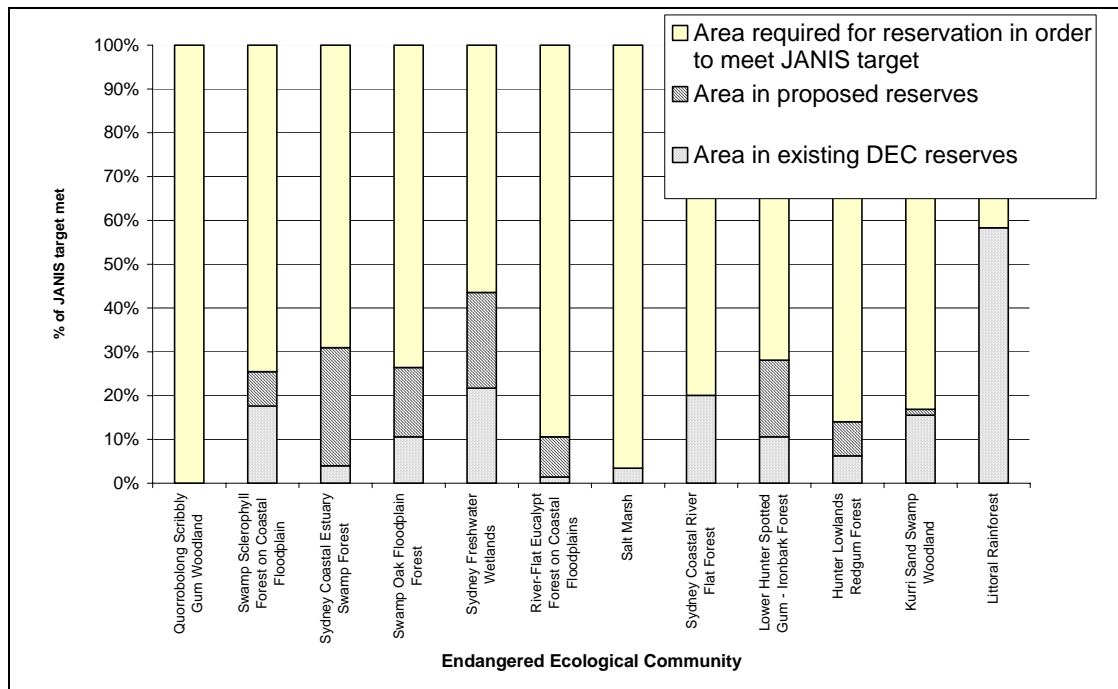


Figure 7: Percentage contribution made to JANIS targets for EECs within existing and proposed reserves in the Lower Hunter.



Note: The target for EECs is 60% of the extant area remaining in the region.

6.3.2 Community benefits of the reserves

The Lower Hunter area is currently under-reserved when compared to the Sydney area (there are 81,000 ha of reserve under the National Parks and Wildlife Act within 50 km of Sydney, while there are 38,000 ha of reserve within 50 km of Newcastle). The RCP will address this imbalance by protecting regional conservation priorities within the Lower Hunter.

The addition of these areas will significantly enhance the recreational and tourism opportunities for communities in the Lower Hunter, particularly in the western areas where significant population growth is anticipated. For example, this may include additional visitor facilities on Ash Island, including walking and cycling trails and BBQ and camping areas. Similarly, there is an opportunity for a regional cycleway through the Hexham Swamp. In addition, opportunities for short-term visitor accommodation (cabins) in the Watagans and Ash Island will be investigated. In the Watagans other visitor opportunities will be considered, including new walking tracks and remote cycling experiences. Conversion of nature reserve to national park will provide greater opportunities for visitor access.

The State Conservation Area on Ash Island will allow continuation and progressive development of the current City Farm and model aeroplane flying area, and establishment of space for other suitable recreational pursuits.

The new reserves will provide important habitat protection for migrating bird species including those species listed on the China Australia Migratory Bird Agreement (CAMBA) and Japan Australia Migratory Bird Agreements (JAMBA). This will help enhance opportunities for passive bird watching in the Lower Hunter area, which is a high profile activity by a number of local community groups and is a recognised tourism asset for the Hunter.

The reserve proposals will provide enhanced protection for Kooragang Island and the Upper Arm of the Hunter River, which are listed under the Ramsar international wetland protection treaty and which have internationally recognised values.

Other benefits accruing from the new reserves will include air and water quality improvements and retention and enhancement of carbon sinks. Carbon sinks are particularly important in the

Lower Hunter, due to locally high Greenhouse Gas Emissions (GGE), including gases sourced from electricity production plants and other high GGE sectors.

6.4 Other regional conservation priorities

Other areas of high conservation value have been identified through the process of developing the RCP. However, for a number of reasons, it is not possible at this point to include these lands within the formal conservation reserve system.

However, those areas of high conservation value which have not been incorporated into the new reserve proposals have been identified as suitable for protection using a suite of other conservation mechanisms. These include biodiversity banking, voluntary conservation agreements under the *National Parks and Wildlife Act 1974*, environment protection zonings or appropriate conservation management plans. These areas include lands under public and private ownership. Some of the key values and areas classified as other regional conservation priorities are shown in Map 3. Nonetheless, the inclusion of the lands in this category will not preclude their formal reservation at a latter date should that be appropriate.

Success in protecting these areas will depend on a range of factors such as the willingness of private landholders to be involved in conservation mechanisms and the availability of funding for acquisition or improved biodiversity management. There may also be opportunities to create future additions to national parks in some of these areas through voluntary acquisition or developer agreements.

These 'non-reservation' regional conservation priorities should be the focus for efforts to offset the biodiversity impacts of high impact projects identified under the regional strategy, and those that arise subsequently. The mechanisms to be employed in offsetting these impacts are likely to include biobanking, planning agreements or dedication of land for national parks or other conservation reserves.

West Lake Macquarie

One key area within the 'other regional conservation priorities' are lands at West Lake Macquarie around Awaba and Morisset [refer Map 3]. While the West Lake Macquarie area has not been identified for formal inclusion in a national park at this time, the area does contain important conservation values that will warrant some form of protection in the future as more detailed plans are made. The DEC acknowledges and formally recognises the conservation value of the West Lake Macquarie region, which is summarised below.

The area supports a diverse range of vegetation communities, most of which are not adequately represented in the reserve system. These include Swamp Sclerophyll Forest on Coastal Floodplain, which is an endangered ecological community. Threatened flora including *Tetradlea juncea* and *Acacia bynoeana* are also found on the site.

These vegetation communities provide significant areas of habitat for a number of threatened species including a large number of threatened forest-dependent species such as forest bats, Squirrel Glider, Yellow Bellied Glider and Forest Owls (Sooty Powerful and Masked). The area also supports a range of wetland dependant threatened birds many of which are listed in international treaties such as the Black Bittern, Australasian Bittern, Blue Billed Duck and Comb Crested Jacana. Threatened woodland birds such as Brown Treecreeper are also present.

It is also acknowledged that the site forms an important linkage between the Watagans and Lake Macquarie, as well contributing to north - south conservation corridors.

The conservation values of this area highlight the importance of ongoing efforts to conserve this site. In the short term, the DEC will be approaching the relevant government agencies regarding the areas of public land to negotiate improved environmental management of the land to preserve its conservation values. In the short

term, this could be achieved using a suite of other conservation mechanisms, including biodiversity banking, voluntary conservation agreements under the *National Parks and Wildlife Act 1974*, environment protection zonings or appropriate conservation management plans. In the longer term, efforts will be made to formally conserve the site in the conservation reserve system.

6.5 Ongoing refinement of the 25-year investment strategy

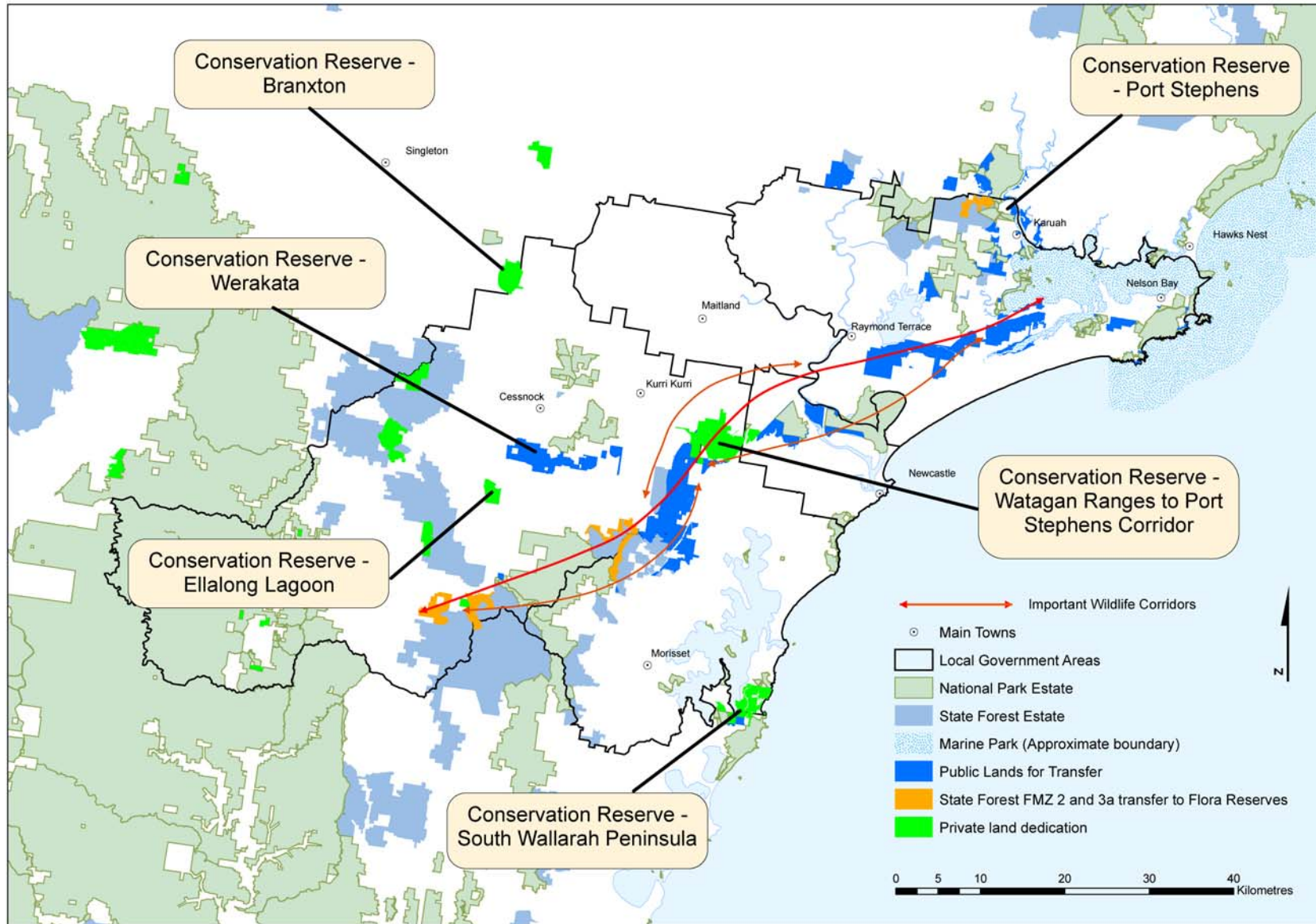
The 25-year investment strategy is to be reviewed every five years. The review will be to ascertain the success of the investment strategy in achieving its conservation goals. The review will include:

- an assessment of progress toward achieving a Comprehensive, Adequate and Representative Reserve System
- the effectiveness of off-reserve conservation mechanisms
- the role of the RCP in biodiversity certification
- the contribution made by biobanking to RCP conservation goals in the Lower Hunter.

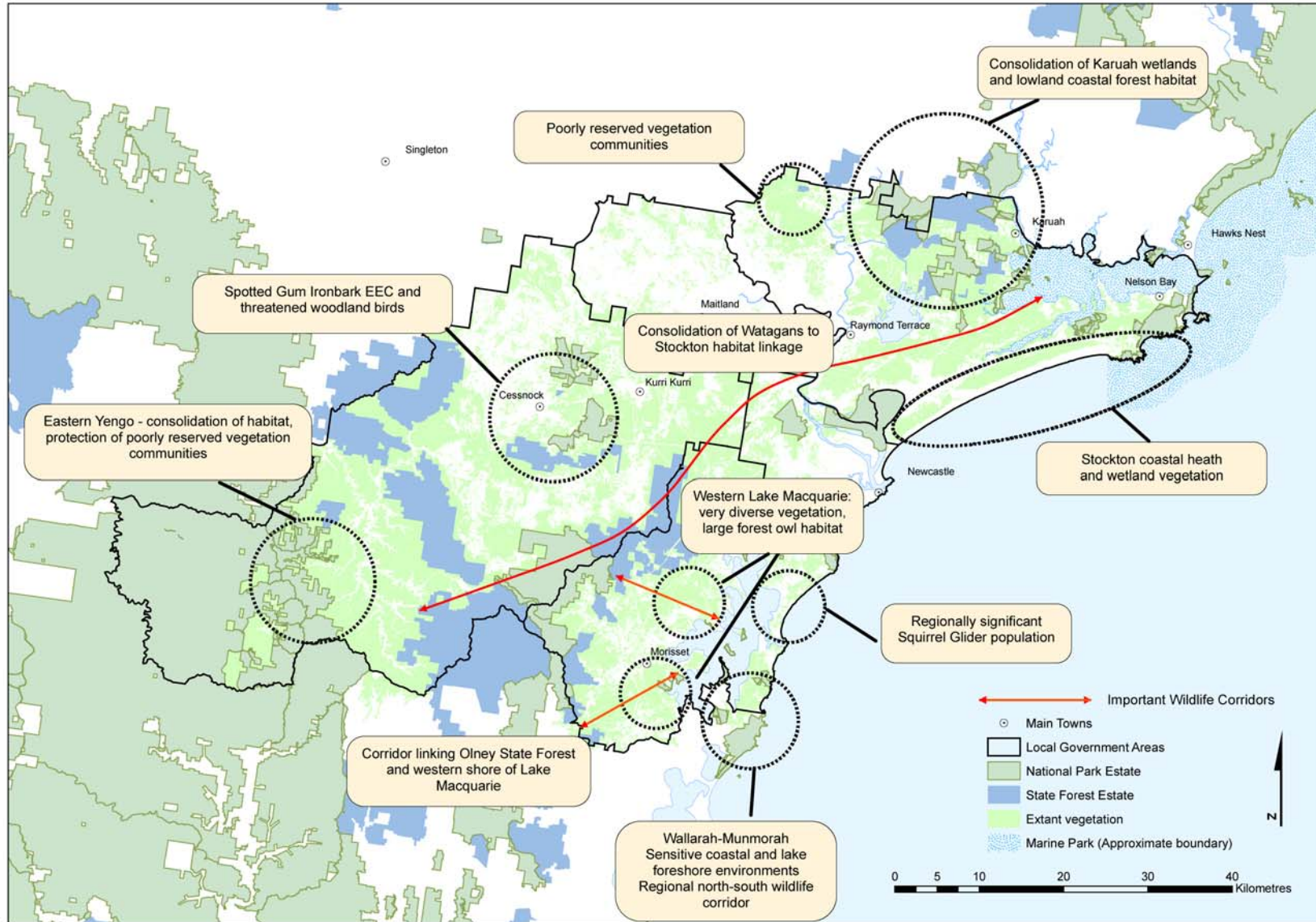
The review may also amend the priorities for conservation, if necessary, taking into account factors such as:

- amendments to development proposals, including extent of clearing within existing development zones
- additional data on features of high conservation significance
- clearing undertaken outside the areas identified in the Lower Hunter Regional Strategy
- successful or unfavourable rehabilitation responses.

Map 2: New Reserve Proposal for the Lower Hunter Region



Map 3: Other regional investment priorities for the Lower Hunter



7 Assessing anticipated biodiversity gains and losses

The Regional Conservation Plan (RCP) identifies the extent of the biodiversity impacts likely to result from implementation of the development scenarios specified in the Lower Hunter Regional Strategy (Section 5). The RCP then identifies in the biodiversity investment guide (Section 6) the offsets required to address these impacts. This section focuses on assessing whether the scale of the proposed offset package is appropriate given the extent of the likely biodiversity impacts.

Two approaches have been employed. These are:

- the extent to which the new reserves and proposed future measures generate progress towards the JANIS reservation targets;
- the extent to which the net result of anticipated gains and losses will achieve the Strategy's overall 'improve or maintain' goal for biodiversity, using a Biodiversity Forecaster tool being developed by DEC.

The strategic application of these two tools has resulted in the ability to significantly reduce potential impacts to biodiversity by guiding development away from avoidable impacts and focusing conservation investment into the most important areas. Neither the tools nor the data are, however, sufficiently developed to be able to generate precise quantitative estimates of the expected net biodiversity position resulting from the various scenarios that were considered. A range of currently unknowable future factors will also significantly influence the outcomes in 25 years.

Nevertheless, the 'improve or maintain' principle has provided a practical benchmark for the assessment of impacts and offsets. The RCP seeks to deliver a balanced outcome based on the known or likely impacts arising from development in the lower Hunter over the next 25 years.

In developing the RCP, it is recognised that it will not be possible to avoid or offset all impacts at a local scale. Accordingly, the RCP focuses on delivering a regionally focused offset package, which in the long term will contribute to an improve or maintain outcome. Therefore, with the best available tools, this section focuses on identifying whether the scale of the proposed offset package is appropriate given the extent of the likely biodiversity impacts.

7.1 What does 'improve or maintain biodiversity' mean?

In simple terms, improve or maintain biodiversity means **no net loss of biodiversity**. That is, biodiversity gains must be greater than, or equal to, any losses resulting from clearing or other forms of degradation of native vegetation.

There are two key goals underpinning the achievement of an outcome that improves or maintains biodiversity:

- a short-term goal of slowing the current rate of biodiversity loss and starting to reverse the trend of decline
- a long-term goal of increasing the extent and diversity of areas of biodiversity value and ensuring they can persist in the long term.

Land use planning decisions will have a major influence on achievement of these goals. An EPI, including a LEP, will contribute to the achievement of these goals and would be considered to improve or maintain biodiversity values if it includes provisions and would deliver land-use planning outcomes that improve or maintain the extent, condition, connectivity, security and persistence of areas of biodiversity value.

DEC's key priorities for biodiversity planning in relation to improving or maintaining biodiversity values are:

- The first priority – to avoid losses to biodiversity, and protect biodiversity values *in situ*. Not only would this see the greatest biodiversity benefit, as the avoidance of impacts would reduce the costs associated with providing offsets or rehabilitating other lands.
- The second priority, where the first priority is unachievable – to mitigate adverse impacts to biodiversity. Mitigation is aimed at minimising and managing impacts in situations where some development will proceed, but the development is anticipated to have only limited impacts on biodiversity.
- As a last resort, compensate for unavoidable losses to biodiversity by providing appropriate offsets. The proposed offset should adequately compensate for the loss of biodiversity on the development site, thereby ensuring that overall biodiversity values are improved or maintained.

7.2 What does 'offsetting' mean?

An offset is one or more appropriate actions that are put in place to counterbalance specific impacts on biodiversity. Appropriate actions are long-term management activities to improve biodiversity conservation. This can include legal protection of land to ensure security of management actions.

7.3 Offsetting principles

The following principles must be considered when negotiating/developing biodiversity offsets to achieve conservation outcomes in situations where there is a loss of biodiversity.

1. Impacts must be avoided first by using prevention and mitigation measures. Offsets are then used to address remaining impacts.
2. All regulatory requirements must be met.
3. Offsets must never reward ongoing poor performance.
4. Offsets will complement other government programs.
5. Offsets must be underpinned by sound ecological principles.
6. Offsets should aim to result in a net improvement in biodiversity over time.
7. Offsets must be enduring – they must offset the impact of the development for at least the period that the impact occurs.
8. Offsets should be agreed prior to the impact occurring.
9. Offsets must be quantifiable – the impacts and benefits must be reliably estimated.
10. Offsets must be targeted – they must offset impacts on a like-for-like or better basis.
11. Offsets must be located appropriately – they must offset the impact in the same region.
12. Offsets must be supplementary – they must be beyond existing requirements and not already be funded under another scheme.
13. Offsets and their actions must be enforceable – through development consent conditions, licence conditions, conservation agreements or a contract.

The offsetting principles are discussed in further detail in Appendix 1.

7.4 Biodiversity Forecasting Tool

DEC used a combination of the offsetting principles (refer Section 7.3), conservation targets and reserve design criteria (Section 3), as well as references in the draft LHRS to derive the conservation proposals outlined in the Biodiversity Investment Guide in this report. The conservation proposals fundamentally include four new DEC reserve proposals and the implementation of a range of investment mechanisms to provide offsets for the development strategy outlined in the LHRS (refer Section 8).

A computer-based analysis tool, the Biodiversity Forecasting Tool (BFT) was used to assist in assessing the biodiversity losses anticipated in the development scenarios and biodiversity benefits of the offsets. It is noted that the BFT was not used to develop the conservation proposals. These were based on the national reserve design principles.

While it would be preferable for offsetting to be undertaken on a like-for-like basis, wherever possible, attempting to model this at a regional scale was too complex to undertake with the existing data and during the available time. As an alternative, DEC adopted a generalised measure of conservation value and applied the 'like value for like value' principle for calculating the gains and losses of the proposals. As a result offsetting could occur between different community types, only if the offset community was of greater conservation significance than the community being impacted.

This analysis does not replace the need to consider offsets in terms of specific conservation features and JANIS targets. However, it does provide a coarse indication of the possible impacts of the development proposal to biodiversity in the region and the potential of the new reserve proposals to offset this cost.

It must be recognised that there are currently limitations to using the BFT for this purpose:

- While analyses have been undertaken using a different tool to test for improve or maintain outcomes on a site scale, DEC is not aware of any previous attempt to do this at the current scale.
- As the BFT is a regional scale analysis, it is currently limited by the best available data at this scale. Vegetation community mapping (Lower Hunter Regional Environmental Management Strategy) has been used as a surrogate for biodiversity.
- Consideration of species specific conservation objectives within the BFT tool are under development but are not currently able to be incorporated.
- The BFT is still under development. It is intended that, when the tool is refined, it will be subject to peer scientific review.
- The outputs of the BFT are limited by the quality of data that is input.

7.4.1 Applying the BFT

The scope of the BFT assessment included greenfield residential development proposals and employment lands contained within the draft Lower Hunter Regional Strategy and areas currently zoned for development. The following activities, which are likely to result in impacts on biodiversity have not been assessed or offset by the Regional Conservation Plan:

- areas required for the provision of infrastructure associated with new release areas
- major development proposals (e.g. mines)
- additional areas not identified in the strategy, which may be developed if they meet the sustainability criteria (page 15 of the Strategy).

There were four steps to the BFT analysis used in this plan:

- **Step 1** – analyse current condition of vegetation as a surrogate for biodiversity.
- **Step 2** – analyse current threats to biodiversity and predict the future condition of biodiversity if there was no change in land use.
- **Step 3** – modify the “current condition” and “threat” layers (derived in steps 1 and 2) to reflect changes in land use according to the new release developments proposed in the draft LHRS and the proposed reserve additions. This provides a model of future condition of biodiversity if these scenarios are implemented.
- **Step 4** – compare the outputs of step 3 (future condition of biodiversity with development and conservation scenarios) with the outputs of step 2 (future condition of biodiversity without development and conservation scenarios). This provides an overall value of the cost to biodiversity from the development scenario and the benefit to biodiversity from the conservation scenario.

Step 1: Analysing current condition of vegetation

DEC adopted a single measure of biodiversity value, the 'Biodiversity Index', which could be applied consistently across the region. This enabled the relative conservation value of

different parts of the landscape to be directly compared. The Biodiversity Index is developed using data on vegetation communities, the extent to which these have been cleared over their range, their condition and the spatial configuration of vegetation patches in the landscape.

Step 2: Analysing current threats to biodiversity and predicting future condition if there is no change in land use

A map of the threats to biodiversity in the Lower Hunter was developed using LEP zonings, relevant SEPPs and agricultural land capability mapping. Areas where high impact development was permissible (for example under a LEP) or likely (in agricultural lands of high productivity) were mapped as being under high threat. Areas provided with special protection such as SEPP 14 were mapped as being under low threat.

The threat operating at any given point in the landscape was taken to be the major determinant of future condition. For instance, where the threat of clearing was high, the future condition was assumed to be cleared. In National Park where the threat was taken as zero, the future condition would be equal to the current condition.

The result was a map of predicted future condition of biodiversity in the Lower Hunter if current land practices continue unchanged, without the development proposed in the LH Regional Strategy or the creation of new reserves.

Step 3: Predicting the future condition of biodiversity if the development and new reserve proposals proceed.

A new 'threats' map was developed by modifying the current threats map to take into account the new release development and new parks proposals. This was applied to current condition mapping to develop a predicted future condition layer.

Step 4: Estimating the biodiversity costs and benefits of the proposal

The costs and benefits of the conservation and development proposals were estimated by comparing the predicted future condition under the *status quo* (from step 2) with the predicted future condition under the new proposals (from step 3).

7.4.2 BFT estimate of anticipated gains and losses

The BFT predicted that the new reserves that are being established now would not, on their own, fully offset the impacts of the planned 25-year development path. For this reason, the Plan proposes other investment mechanisms, including Biobanking, developer agreements, government investments and voluntary measures to be implemented to balance the residue of unavoidable future losses over the 25-year life of the Strategy. The necessary quantum and types of strategies will be further investigated as new LEPs are developed, in partnership with local councils. The biodiversity investment mechanisms should target the values that are not already offset by the new area proposals, but could also be used to consolidate the biodiversity functioning of the new reserves (e.g. strategic linkages or infilling) (refer Map 3).

While the BFT did provide an indication of the gains and losses and assisted in guiding decisions on the quantum of offsets required, it is not currently feasible or appropriate to draw any definitive conclusions on whether the planned offsets will achieve a improve or maintain outcome over the next 25 years. This reflects both technical and data limitations, and the inherently level of uncertainty that exists about the nature and effects of future decisions and actions.

The work does, however, provide a strong basis on which to begin implementation and to guide future action.

8 Implementation Mechanisms

8.1 Stage 1 – Immediate implementation

In releasing this Plan, the Government is making a set of significant commitments to offsetting biodiversity impacts in the Lower Hunter. This will see biodiversity gains exceed anticipated losses by a considerable margin for many years. Stage 1 involves both public and private land being protected as new perpetual conservation reserves under public ownership.

The public land transfers involve over 20,000 hectares of high conservation value lands, which will be reserved to form the backbone of major new conservation corridors. These areas are shown on the Map 2, and will be transferred progressively under legislation to be introduced into the current session of Parliament.

While the majority of the lands will be transferred to conservation reserves under the *National Parks and Wildlife Act 1974*, approximately 2,900 hectares of State Forest will be reclassified as flora reserves under the *Forestry Act 1916*, thus securing their conservation values. The State Conservation Area category under the National Parks and Wildlife Act will be used in areas that retain potential for underground mining (or for current operations). This category recognises that mining may generate some surface impacts (mainly of a temporary nature) including subsidence and where ventilation or access infrastructure is required. The Government's intent has been to ensure that the new reserves do not sterilise economic mineral and coal resources that can be extracted through underground methods.

The public land transfers represent a significant conservation commitment that will be funded by the Government, which will significantly expand the reserve system in the Lower Hunter. As a result critical areas of biodiversity will be protected in perpetuity, whilst also providing the communities of the Lower Hunter with significantly improved access for recreation and enjoyment.

In addition to the public land transfers, approximately 12,000 hectares of high conservation value freehold land will be dedicated by private landholders to new and existing reserves in exchange for appropriate development rights. As well as exhibiting outstanding biodiversity value, much of this land is strategically located and will secure critical components of the proposed green corridors, including areas near Stockrington and the Tank Paddock, as well as on South Wallarah Peninsula.

The new reserves created through these transfers and dedications include:

- a new 'Green Corridor' stretching from Watagans Ranges, through Hexham Swamp to Port Stephens (approximately 14,600 hectares)
- a green buffer on the South Wallarah Peninsula to separate Newcastle from the Central Coast (approximately 1,250 hectares)
- important areas around Ports Stephens in the Karuah area (3,000 hectares)
- a large addition to Werakata National Park near Cessnock (2,200 hectares)
- two new parks containing under-reserved endangered ecological communities on the Hunter Valley floor near Branxton and at Elderslie (1,330 hectares)
- a new park encompassing Ellalong Lagoon, which contains important freshwater wetland communities (430 hectares)
- other large additions to Wollemi and Yengo national parks (6,000 hectares).

While these transfers and dedications represent a significant contribution to offsetting the biodiversity impacts, they will not fully offset the biodiversity impacts of the planned 25 years of future development. Additional offsets will be required in order to deliver an improve or maintain outcome for biodiversity in the Lower Hunter over that period. Mechanisms to assist in delivering these additional offsets are the focus of the following Section 8.2.

8.2 Stage 2 – Mechanisms

Mechanisms that will contribute to offsetting the anticipated biodiversity impacts resulting from development in the Lower Hunter, including development of the employment lands identified in the LHRS and areas currently zoned for development, are discussed in the following sections.

To summarise, it is planned that:

- the majority of the public land identified in the biodiversity investment guide as new DEC reserve proposals will be transferred to conservation reserves under the *National Parks and Wildlife Act 1974*, with the remaining areas converted to flora reserves under the *Forestry Act 1916*
- voluntary acquisition of the private land component of the new area proposals will be secured through future developer agreements, voluntary conservation agreements, biobanking or through other market based mechanisms
- other identified high priority conservation areas identified in the 25 year investment strategy will be protected from any intensification of the current land uses through the appropriate application of the sustainability criteria as set out in the Strategy
- employment lands identified in the LHRS and lands currently zoned for development, but not currently developed, can potentially offset their biodiversity impacts through the mechanisms identified in Sections 8.2.2–8.2.10. It is recommended that Biobanking and Planning Agreements provide the focus of efforts to offset these impacts, although it is acknowledged that the mechanisms to be adopted will be determined at the discretion of the relevant consent/determining authority and in the context of any future State Contributions Scheme.

These mechanisms, if implemented, will deliver a balanced and significant conservation outcome based on a mix of public and private conservation land management.

8.2.1 Biodiversity Offsets and Banking Scheme

Biodiversity Offsets and Banking Scheme (BioBanking) mechanisms are currently being developed by the DEC. Biobanking is a market-based instrument that provides a means of ensuring that biodiversity offsets are implemented consistently and strategically in advance of the impacts of development. This can generate better environmental outcomes at lower cost with greater long-term security than conventional approaches to environmental management.

Biodiversity offsets (secured in-perpetuity through conservation agreements or covenants) might include:

- enhancing habitat on private land to improve its biodiversity value
- reconstructing habitat in strategic areas to link areas of high conservation value or increase buffer zones around areas of high conservation value
- providing secure conservation tenure for land that contains very high conservation value.

On-ground conservation management actions might include:

- removing or reducing grazing pressure (controlled grazing) to allow for natural regeneration of native plants
- controlling exotic plant species that compete with native species
- leaving fallen timber on the ground (i.e. not collecting fire wood) to provide shelter for wildlife
- controlling feral animals (foxes, cats) that pose a threat to wildlife populations
- planting or regenerating locally indigenous trees, shrubs and grasses.

A rule-based biodiversity assessment tool is currently being developed by DEC. This will be based on the tools that have been developed for the property vegetation planning process

under the *Native Vegetation Act 2003* (BioMetric tool and the threatened species tool). The tool will be used to determine the amount and significance of biodiversity loss that a development will cause and the improvement in biodiversity value provided by the conservation management actions on the offset site(s).

There will be two main types of participants in the scheme. These are developers that require credits and offset providers (private conservation stewards) whose projects would generate credits.

Conservation brokers might also play a role in the scheme to assist private conservation stewards to put together and market their projects. Conservation brokers might include catchment management authorities, not-for-profit organisations, non-government organisations or members of the private sector.

For more information on biobanking, please refer to the *BioBanking: A Biodiversity Offsets and Banking Scheme – Working Paper*, available on the DEC's website.

8.2.2 Planning Agreements

Recent amendments to the *Environmental Planning and Assessment Act 1979* introduced a statutory system of planning agreements. Planning agreements provide a voluntary facility for planning authorities and developers to negotiate flexible outcomes in respect to development contributions. They are a means to enable the planning system to deliver sustainable development, through which key economic, social and environmental objectives of the State and local government can be achieved.

Planning agreements aim to provide essential public services, including infrastructure, as well as the conservation or enhancement of the natural environment. As such, planning agreements are currently being viewed as one of a series of methods to be utilised to ensure that the environmental impacts of a development are taken into account, and that appropriate impact mitigation, site amelioration and/or offsets are provided by the developer, at the developer's expense. Planning agreements may be additional to, or replace, the relevant Section 94 Developer Contributions Scheme applying to a particular LGA.

While planning agreements will be instigated largely at the rezoning stage, the provisions of these agreements will be written in such a way that they will carry through to the development application phase. As such, planning agreements can be viewed as having a strategic planning basis, and one that has statutory links with the development application process. This, in effect, is anticipated to achieve far better outcomes in terms of achieving sustainable development outcomes, including biodiversity conservation.

8.2.3 Voluntary Conservation Agreements

A Voluntary Conservation Agreement (VCA) is a negotiated contract between landholders and the Minister for the Environment which aims to conserve the natural, cultural and/or scientific values of a property or portion of a property, restricting land uses likely to compromise these values. Landholders may be individuals, groups, corporations, local governments or government departments. In the case of government departments, either the department or the Minister responsible for that department may enter into the VCA with the Minister for the Environment.

The aim of a VCA is to facilitate conservation on private and public land by working with people and communities in conservation management. This approach seeks to complement the formal reserve system, support recovery of threatened species, populations and communities, conserve cultural heritage, aid the movement of wildlife in the landscape and to protect, restore and rehabilitate high conservation value areas.

Once signed by both the Minister and the landholder, the VCA is registered on the land title, binding all 'successors in title' (future landholders) to its terms.

The VCA program relies upon the active management of the lands by the landholder. Toward this aim, DEC consults with the landholder to develop a Plan of Management for the area

covered by the VCA. The Plan is intended primarily for the landholder's use and establishes practical methods for conservation managed at each site.

8.2.4 Covenants

Legal restrictions on use of land are able to be developed and implemented under the *Conveyancing Act 1919*. Restrictions on the uses can be applied as a condition of consent at the subdivision stage of a development. Covenants can restrict land use and may be linked to management plans and other agreements (Fallding 2004).

8.2.5 Management agreements

Management agreements are legal agreements or contracts to manage specific land parcels or restrict land use or activities. These agreements may also be linked to covenants, development rights, consent conditions or financial incentives and may be registered on land title and be binding on subsequent owners or, be a contract for a certain number of years (Fallding 2004).

8.2.6 LEP making and certification

DEC is currently finalising the 'Guidelines for biodiversity certification of environmental planning instruments'. These Guidelines will define the factors to be considered in granting certification, data requirements, the effect of certification, as well as range of other guidance on its operations of certification.

These Guidelines include a requirement that EPIs must be consistent with the objectives of the RCP and contribute to the conservation of priority areas as identified in the RCP if they are to merit certification.

When Councils are preparing new LEPs, for which they intend to seek certification, they will need to:

- a) demonstrate that the EPI is consistent with the objectives of the RCP, and
- b) provide a high level of environmental protection to those areas identified as regional conservation priorities in the biodiversity investment guide [refer Section 6]; and
- c) recognise and provide an appropriate level of protection to areas of state and regional biodiversity significance¹.

This approach is recommended until such times as the funding becomes available to protect and manage the regional conservation priorities in perpetuity. Such an approach will also assist in moderating the pressures that might otherwise compromise the lands' biodiversity values.

Further detailed guidance on the biodiversity values and areas, will need to be provided to council's seeking certification, prior to any decision being made on whether the proposed LEP complies with the criteria detailed above.

8.2.7 Environmental impact considerations

A number of legislative provisions currently exist that help to manage biodiversity. One such mechanism is the Environmental Impact Assessment (EIA) provisions contained within the EP&A Act. An EIA cannot usually achieve the same degree of biodiversity protection as broad area or strategic planning (because it normally operates within a local context where land is already zoned for a purpose). Nonetheless, an EIA will continue to provide an essential adjunct to strategic planning mechanisms in the protection, management, enhancement and restoration of biodiversity, such as through the application of conditions of consent. Furthermore, it is anticipated that the information collated as part of the EIA process will provide important site level guidance to developing appropriate management actions, including offsetting of biodiversity losses.

This Plan, and its investment priorities are provided to assist the full range of development assessments under Parts 3A, 4 and 5 of the EP&A Act. DEC state and regional biodiversity

¹ As defined by DEC's biodiversity constraints data 2006.

constraints mapping (2006) should also be a key consideration in any EIA process. These constraints should be applied in any concept design/master planning/strategic planning process, including Part 3A projects. Impacts on areas of state and regional biodiversity significance should be avoided wherever possible.

8.2.8 Property Vegetation Planning

The Biodiversity Investment Guide is also intended to be of use to the Department of Natural Resources and catchment management authorities in relation to the assessment of clearing applications made in accordance with the *Native Vegetation Act 2003* (NV Act) and in the Property Vegetation Planning (PVP) process.

The NV Act regulates broadscale clearing (clearing of native vegetation or protected regrowth) on all land in NSW, except for State Forest, urban land, national parks and other conservation reserves.

A PVP is a voluntary but legally binding agreement between a landholder and the Catchment Management Authority. PVPs will have the effect of allowing specified clearing, but only following the implementation of an appropriate offset regime, so as to achieve overall maintenance or improvement of environmental outcomes.

The investment strategy is intended to complement on-site planning for PVPs by providing information on biodiversity values at the regional and state scale. Note that due to data and mapping limitations, there are some features of high conservation value discussed in this plan (such as some patches of EECs) that have not been mapped. Due to mapping constraints, there will be many features of high conservation value at the site scale, such as habitat trees, that are not taken into account in the RCP that will need to be addressed at the site scale. These types of features are already incorporated in property vegetation planning assessment tools.

8.2.9 Catchment management

The area covered by the LHRs and this Regional Conservation Plan comprises a relatively small part (approximately 11.5%) of the area covered by the Hunter–Central Rivers Catchment Management Authority’s (CMA) draft Catchment Action Plan (CAP). The bulk of the development planned in the Strategy will be on urban land, where the CMA’s statutory approval roles are not triggered.

However, the role of the Hunter–Central Rivers CMA, as set out in the *Catchment Management Authorities Act 2003*, is to coordinate the management of the natural resources in its region. The CMA is responsible for involving communities in managing the natural resource issues facing the region through partnerships and collaborations. The CMA is also the primary means for delivering natural resource funding from the NSW and Australian governments (Hunter–Central Rivers Catchment Management Authority 2006).

As outlined within the draft CAP, the vision of the Hunter–Central Rivers CMA is for healthy and productive catchments through the ecologically sustainable management of natural resources and the environment for the benefit of present and future generations.

The CAP also outlines the most important natural resource issues in the region. Although the CAP is not a legally binding document, it attempts to guide how improvements in natural resources will be achieved over the next ten years. It defines where effort and funding should be focused to get the best protection and improvement in natural resources and the most benefits for the community (Hunter–Central Rivers Catchment Management Authority 2006). This RCP is consistent with the goals and objectives of the draft CAP.

The CAP will also provide a coordinated plan for all natural resource work in the region through partnerships and collaborations with government, industry, community groups and individuals. By listing the most important natural resource issues in the whole region, the CAP can guide rehabilitation effort where it is most needed (Hunter–Central Rivers Catchment Management Authority 2006).

8.2.10 Priority actions for threatened species recovery

The *Threatened Species Legislation Amendment Act 2004* established a requirement for DEC to prepare a Priorities Action Statement (PAS). The PAS sets out the recovery and threat abatement strategies to be adopted for promoting the recovery of each threatened species, population and ecological community to a position of viability in nature. The PAS also establishes relative priorities for implementation of these strategies and establishes performance indicators to enable reporting on the achievements and their effectiveness. The PAS is available on DEC's website.

The PAS also contains a status report on each threatened species, where information is available, and set out timetables for recovery and threat abatement planning. The PAS works in conjunction with recovery plans and programs already approved and in progress. It will not supersede or replace existing programs, rather provide a broader context for the actions of those programs.

The actions listed in the PAS should be taken into account by councils when preparing new LEPs.

8.3 Protection of biodiversity values via the sustainability criteria

The LHRS plans for population and employment growth over the next 25 years. It seeks to focus the development required to accommodate this growth into those areas identified as most suited for the purpose, while at the same time, ensuring that consideration is given to the implications of new development on biodiversity.

In order to focus development in the most suitable areas, the strategy includes supplementary sustainability criteria, which will be used to assess any rezoning proposals brought forward for outside these areas. The strategy recommends that the criteria will not be applied in large areas within the principal 'green corridor' as defined in the strategy. This corridor runs from the Watagans to Port Stephens and encompasses all of the areas east of the highway north of Hexham not already proposed for future development.

8.4 Optimising urban development through design

It is recommended that the proposed Hunter Urban Development Program and future LEPs include mechanisms to minimise avoidable impacts on areas of biodiversity significance from the impact of future development. The mechanisms should focus on protecting key biodiversity values, including:

- to protect the ecological integrity of lands dedicated under the *National Parks and Wildlife Act 1974*, the guidelines will recommend appropriate controls on any development adjacent to these areas
- the protection of riparian corridors;
- any declared critical habitat, threatened species and threatened species habitat, as defined by the *Threatened Species Act 1995* (TSC Act)
- any endangered populations and endangered ecological communities listed under the TSC Act
- core koala habitat as defined under SEPP 44 – Koala Habitat Protection or as defined in a local government Koala Plan of Management
- protection of areas identified as SEPP 14 Coastal Wetlands and SEPP 26 Littoral Rainforests
- protection of the habitat of birds listed under CAMBA, JAMBA and the Convention of Migratory Species of Wild Animals.

The program should also include criteria to protect objects and areas of Aboriginal cultural heritage significance as well as environmental protection criteria. The environment protection criteria will focus on sustainably managing potential impacts from development in terms of air and water quality, as well as managing potential land-use conflict particularly in regard to noise and odour.

8.5 Additional support to be provided

DEC will work with councils and other stakeholders to help implement this Plan. DEC will provide support in the form of advice, guidance documents and practical action partnerships. The support documents in preparation are listed below:

- guidelines for biodiversity certification
- survey and assessment guidelines for biodiversity (or wildlife/flora and fauna). Refer to www.nationalparks.nsw.gov.au/pdfs/tbsa_guidelines_draft.pdf for a copy of the draft guidelines
- policy and documentation on the use of the biodiversity forecasting tool for regional and local planning processes
- documentation and training to support the BioBanking Scheme
- guidelines for environmental impact assessment of biodiversity values in areas identified for development
- summary of the Priorities Action Statement relevant to each region/LGA.

DEC welcomes feedback on these priorities and information on potential partnerships or additional support that it may be able to provide.

9 References

Australian Local Government Association 1999. *National Local Government Biodiversity Strategy*.

Commonwealth of Australia 1996. *The National Strategy for the Conservation of Australia's Biological Diversity*, Canberra: DEST.

Commonwealth of Australia 1997. *Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia*. A Report by the Joint Australian and New Zealand Environment and Conservation Council / Ministerial Council on Forestry, Fisheries and Aquaculture National Forest Policy Statement Implementation Sub-committee (JANIS). Canberra.

Commonwealth of Australia 2005. *Directions for the National Reserve System: A partnership approach*. Report prepared by the National Resource Management Ministerial Council.

Department of Primary Industries 2004. Weed bait for anglers to help protect Koorangang Wetlands. News release 15 February 2004.

Environment Australia 2000. Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and the Development of Version 5.1. - Summary Report. Department of Environment and Heritage, Canberra.

Fallding, M, Kelly, AHH, Bateson, P, Donovan, I, 2001. *Biodiversity Planning Guide for Local Government*, Edition 1. Prepared by Land & Environment Planning and Environs Australia for the NSW National Parks and Wildlife Service, Sydney.

Fallding, M 2004 'Planning for Biodiversity' in *Australian Planner* Vol 41 No 4, p45–50.

Glaznig, A. 1995. Native Vegetation Clearance, Habitat Loss and Biodiversity Decline: an overview of recent native vegetation clearance in Australia and its implications for biodiversity. Biodiversity Series, Paper No. 6. Commonwealth of Australia.

Hunter-Central Rivers Catchment Management Authority 2006. Draft Catchment Action Plan, January 2006.

Lindenmayer, D. and Burgman, M. 2005. *Practical Conservation Biology*. CSIRO Publishing, Collingwood.

National Parks and Wildlife Service 1999. NSW Biodiversity Strategy. NSW National Parks and Wildlife Service, Sydney.

Rodrigues, A.S.L, R. Akçakaya, S.J. Andelman, M.I. Bakarr, L. Boitani, T.M. Brooks, J.S. Chanson, L.D. C. Fishpool, G. Da Fonseca, K.J. Gaston, M. Hoffmann, P. Marquet, J. D. Pilgrim, R. L. Pressey, J. Schipper, W. Sechrest, S. N. Stuart, L. G. Underhill, R.W. Waller, M. E. J.Watts, Xie Yan 2004. Global Gap Analysis: Priority Regions For Expanding The Global Protected-Area Network. *Bioscience*, 54, 12, pp1092-1100.

Appendix 1 – Offsetting Principles

1. **Impacts must be avoided first by using prevention and mitigation measures. Offsets are then used to address remaining impacts.** This may include modifying the proposal to avoid areas of biodiversity value or putting in place measures to prevent offsite impacts.
 - Clearing or development can only proceed where offsets (and conservation actions) improve or maintain biodiversity.
2. **All regulatory requirements must be met.** Offsets cannot be used to satisfy approvals or assessments under other legislation, for example, assessment requirements for Aboriginal heritage sites, polluting activities or other environmental impacts unless specifically provided for by legislation, or additional approvals.
3. **Offsets must never reward ongoing poor performance.** Offset schemes will not reward landholders who deliberately degrade or mismanage land in order to provide an offset. Offsets must not reward poorly designed developments.
4. **Offsets will complement other government programs.** A range of tools are required to achieve the NSW Government's conservation objectives, including the establishment and management of new conservation areas, regional parks and incentives for private landholders to manage for conservation purposes.
5. **Offsets must be underpinned by sound ecological principles.**
 - They must include the consideration of structure, function and compositional elements of biodiversity, including threatened species.
 - They must enhance biodiversity at a range of scales, that is, at the genetic, species and ecosystem levels.
 - They must consider conservation status of ecological communities.
 - They must ensure the long-term viability and functionality of biodiversity.

Biodiversity management actions, such as enhancement of existing habitat and securing and managing land of conservation value for biodiversity, can be suitable offsets. Reconstruction of ecological communities involves high risks and uncertainties and time delays for biodiversity outcomes. It is generally less preferable than other management strategies such as enhancing existing habitat.

6. **Offsets should aim to result in a net improvement in biodiversity over time.**
 - Enhancement of biodiversity in offset areas should be equal to or greater than the loss in biodiversity from the impact site.
 - Setting aside areas for biodiversity conservation without additional management or increased security is generally not sufficient to offset against the loss of biodiversity. Factors to consider include protection of existing biodiversity, time-lag effects, and the uncertainties and risks associated with actions such as revegetation.
 - Offsets may include enhancing habitat, reconstructing habitat in strategic areas to link areas of conservation value, or increasing buffer zones around areas of conservation value.
7. **Offsets must be enduring – they must offset the impact of the development for at least the period that the impact occurs.** All offsets must be secured by an appropriate legal mechanism. As impacts on biodiversity are likely to be permanent, the offset must also be permanent (secured by a conservation agreement or reservation and management for biodiversity). Wherever possible, offsets should be secured by a conservation agreement attached in perpetuity to the title of the land (eg. under s69 *National Parks & Wildlife Act 1974*). Where land is donated to a public authority or a private conservation organisation and managed as a biodiversity offset, it should be accompanied by resources for its management. If an appropriate legal mechanism to secure the offset is not possible, then the value of the offset will be reduced. Alternative mechanisms, such as land use planning zones, may be appropriate where they

complement conservation agreements. However, such mechanisms alone do not necessarily provide long-term security. The security of the management agreement will be factored into the value of the offset.

8. **Offsets should be agreed prior to the impact occurring.** Offsets should minimise ecological risks from time-lags. Offset negotiations and actions should occur prior to the approval of the impact. For example, prior to the grant of a development consent. Where the offset involves rehabilitation or revegetation works it may be necessary to conduct this work well in advance of the development.
9. **Offsets must be quantifiable – the impacts and benefits must be reliably estimated.** Offsets should be based on quantitative assessment of the loss in biodiversity from the clearing or other development and the gain in biodiversity from the offset. The methodology for calculating the biodiversity loss and gain must be based on the best available science, be reliable and used for calculating both the loss from the development and the gain from the offset (Note that a state-wide computer based tool will be developed for Biobanking based on the tools developed for the *Native Vegetation Act 2003*). The best available information/data should be used when assessing impacts of biodiversity loss and gains from offsets. Offsets will be of greater value where they protect land with high conservation values, where management actions have greater benefits for biodiversity, where the offset areas are not isolated or fragmented, and the management for biodiversity is in perpetuity (eg. secured through a conservation agreement). Management actions must be deliverable and enforceable.
10. **Offsets must be targeted – they must offset impacts on a like-for-like or better basis.** Offsets should be targeted according to biodiversity priorities in the area, based on conservation status of ecological communities, presence of threatened species or their habitat, connectivity, and potential to enhance condition from management actions. Only ecological communities that are equal or greater in conservation significance to the type of ecological community lost should be used for offsets. One type of environmental benefit cannot be traded for another. For example, biodiversity offsets may also result in improvements in water quality or salinity but these benefits do not reduce the biodiversity offset requirements. However at a regional level it maybe ecologically of greater benefit to consolidate offsets by linking high conservation values across the landscape. This may involve offsets, which are spatially removed from the offset, or compromise different vegetation communities.
11. **Offsets must be located appropriately – they must offset the impact in the same region.** Wherever possible, offsets should be located in areas that have the same or similar ecological characteristics as the area affected by the development, in reasonable proximity to the region impacted.
12. **Offsets must be supplementary – they must be beyond existing requirements and not already be funded under another scheme.** An offset used in the past for another project cannot be used again to offset a new project. Areas that have received incentive funds from another process cannot be used for offsets. Existing protected areas on private land cannot be used for offsets unless additional security or management actions are implemented. Areas already managed by the government, for example national parks, flora reserves, nature reserves, karst conservation areas and crown reserves, cannot be used as offsets. In some cases, new management works on public lands could be used as an offset.
13. **Offsets and their actions must be enforceable – through development consent conditions, licence conditions, conservation agreements or a contract.** Offsets must be audited to ensure that the actions have been carried out, and monitored to determine that the actions are leading to positive biodiversity outcomes.