



Biodiversity Strategy

Liverpool City Council

August 2003



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Part A: Introduction

Liverpool City Council Biodiversity Strategy

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This Biodiversity Strategy sets out to provide information and tools to assist Liverpool City Council to better manage the native plants and animals and their environment (biodiversity) in the Liverpool local government area. This report is divided into four parts.

- **Part A: Introduction and Objectives**- provides an introduction to the strategy that includes the aims and objectives, an explanation of the report structure and a guide to using the document.
- **Part B: Strategies and Actions** - provides strategies and actions to assist Council and Council staff to put planning and management systems in place that protect and enhance the biodiversity of the Liverpool area. Guidelines for selected strategies are provided in Part D.
- **Part C: Principles, Justification and Policies** - outlines for decision makers the objectives, principles, policies and legislation which underpins the biodiversity management strategies and actions set out in Part B. It provides background information, including a brief discussion of what biodiversity is and provides an overarching context for the strategy, it also sets out three new policy positions and the management objectives for land that are of conservation significance within Liverpool.
- **Part D: Tools and Resources** - details technical information including maps, ecological information, species lists, and statutory planning tools. This section also includes sets of guidelines which aim to help staff in their day-to-day work.
- **Part E: Maps** – provides a range of mapping products and technical information.

The format of the Biodiversity Strategy allows for it to be a dynamic document to be updated as required.

Part A. Introduction and Objectives

1 Liverpool City Council's Roles and Responsibilities

Local government is increasingly being asked by the Community and required by law to take a greater role in the management, protection and enhancement of the natural environment. Some of the environmental and planning issues faced by Liverpool City Council are common to local governments across NSW, many however are unique to Liverpool and require tailored and strategic responses.

Whilst there is a range of Commonwealth and State legislation that needs to be considered, Council has a particular charter as set out in the *Local Government Act 1993* to address biodiversity conservation. Section 8 of the Act details this charter:

'to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible, in a manner that is consistent with and promotes the principles of ecologically sustainable development

This Strategy provides Council with a strategic and practical approach to undertaking its roles and responsibility to the protection, enhancement and conservation of the native plants and animals dependent upon appropriate planning and management of the Liverpool local government area, whilst ensuring compliance with the relevant Commonwealth and NSW legislation.

2 Aims of this Biodiversity Strategy

The overall aim of the strategies, actions and guidelines in this document is to:

1. Provide for the conservation of native plants, animals, habitat and ecological processes in the Liverpool local government area.
2. Provide priorities and guidance for Council in making decisions relevant to managing these native plants and animals, and the natural environment of the area.
3. Provide guidance for the use, conservation and enhancement of natural resources in the Liverpool Local Government Area according to the principles of Ecologically Sustainable Development.
4. Provide a greater level of certainty for the community via a pre-defined, transparent and accountable process.

3 Liverpool City Council's Biodiversity Objectives

In this document, biological diversity encompasses all **native** plants and animals, genetic variations, populations, ecosystems and ecological processes in the Local Government Area (LGA) area and surrounding region.

The following objectives sit along side the objectives set out in the Council's Corporate Plan. The update and revision of the Liverpool Corporate Plan provides the opportunity to inform this biodiversity strategy and review and update it's objectives.

The strategies and actions set out in this Strategy are designed to meet the objectives set out below. The policies, procedures and work practices of Council will be kept up to date to help meet these objectives.

- a. Maintain, protect, enhance and restore naturally occurring ecosystems, communities and species within the Liverpool area so that:
 - Targets developed for the protection of the various vegetation communities (Part D) are to be met;
 - Targets developed for the area of each vegetation community to be retained in good condition (Part D) are to be met;
 - A high level of connectivity between vegetation communities and patches is achieved through the establishment of a corridor network; and
 - Threats and threatening processes to endangered ecological communities, threatened species and critical habitat, are reduced.
- b. Provide for social and economic growth and well-being, in ways that do not adversely impact on the health and survival of the area's biodiversity or increase fragmentation of habitat.
- c. Work with the community and all levels of government to develop partnerships to maintain, protect, enhance and restore flora and fauna and their habitat, and ecosystems within the Liverpool area.
- d. Develop a detailed understanding of the area's flora and fauna and the habitat and ecological process which support them, and apply this knowledge.
- e. Contribute to the protection of biodiversity at a local, regional, national and global level

4 Who Is This Strategy For?

This strategy is designed to be used by Council staff and Councillors, with objectives, policies, resources and information provided for the broader Community. Staff within the various Council departments will find different

sections of use to them, and the roles they undertake that contribute to the planning and management of land and natural resources in the Liverpool area.

This document is designed to:

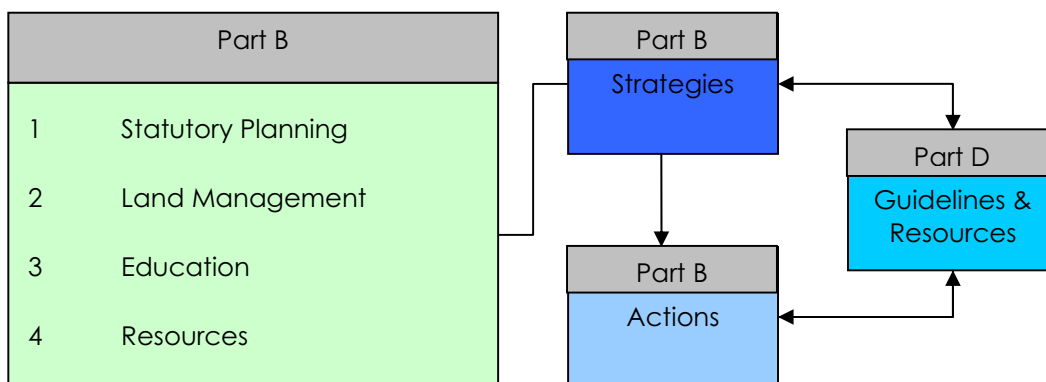
- Guide staff in considering issues affecting biodiversity when making land use planning, management, resourcing, training and operational decisions.
- Set out a framework within which Council can make decisions with the Community and State Government agencies, which will positively impact on the future of the biodiversity of the Liverpool area.

5 How to Use the Strategy

The document is presented in a structural hierarchy. At the top level are specific strategies that provide overall guidance and direction for Council decision making to achieve the overarching biodiversity objectives identified above.

A set of actions is provided under each strategy that will need to be undertaken. These actions seek to achieve the outcome of each specific strategy.

Flowing on from this, a set of procedural guidelines (Part D of the strategy) have been developed that provide practical guidance for staff undertaking specific tasks e.g. strategic planning, plans of management, data management. Staff performing the roles referred to by the guidelines can use these as a direct checklist to facilitate achieving outcomes that will contribute to the conservation, management and enhancement of biodiversity in the Liverpool area, on a day to day basis.



This biodiversity strategy has been designed to allow for each part to be separated into standalone sections and used as required in everyday procedure and operating practices. In particular, Part B *Strategies and Actions* has been divided into sections that relate to the various roles of Council.

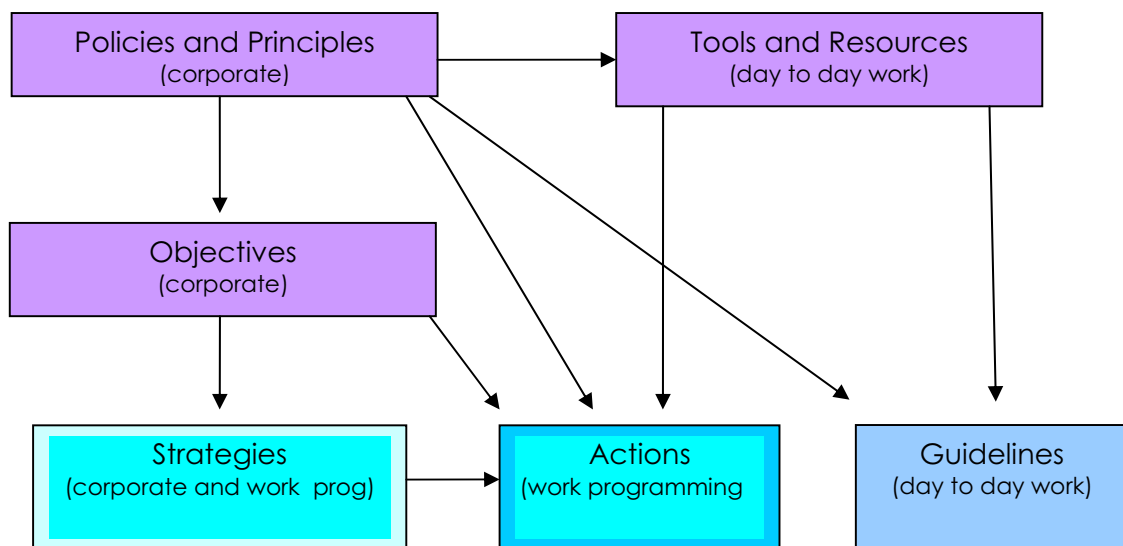
Part C covers the principles, justification and policies that support the Strategy's aims, objectives and specific strategies set out in Part B. Part C also sets out three new policies for 'Habitat Compensation Offsetting', establishing conservation targets, and establishing a system of riparian corridors and regional connectivity. This section should be referred to whenever this Strategy is being revised or when new policies, strategies, actions or guidelines are being developed. It is also a useful reference document for anyone interested in finding out more about biodiversity conservation and management.

Part D provides tools and resources, and includes a range of reference documents and specific guidelines covering Council procedures to assist staff and other decision makers. This section includes species lists and information about the ecology of the Liverpool area.

Part E includes a technical report and five maps. These resources can be used on a day-to-day basis to assist staff in a range of tasks. They also provide valuable information to assist land managers and those proposing development to make management and planning decisions that will not adversely impact on the biodiversity of Liverpool.

6 Inter-relationships and Linkages

The relationship between this document and its intended use in Council is illustrated in the figure presented below:



This diagram illustrates how the different components of the strategy can be applied to assist in planning work for Council staff.

6.1 Links between Strategies

This strategy has been guided by the inter-relationship between various council functions, namely statutory and management planning, operational management, education, funding and resources, and overall monitoring. The planning and management activities that Council undertakes engage a range of different tools that come together to achieve required objectives. These tools can make up part or all of a particular function within Council. These tools and functions may be linked through Council procedure, legislation, practical necessity or purely by logical sequence.

For instance a management requirement may inform a procedure or action at the planning stage, may be implemented operationally by key staff, may be assisted through the use of council or community education, could require monitoring at various stages and will need a source of funding to implement. Within this relationship there may also be other linkages across each function.

The individual strategies and actions in this document will only be effective when implemented in conjunction with other actions and strategies. This biodiversity strategy is written within the context of these relationships and should be used as such.

6.2 Links to other Documents

This strategy document is linked to the Liverpool City Council Corporate Plan, the Liverpool Environment Plan and a number of other documents. These documents have provided the impetus for this strategy. As the strategy develops and becomes integrated into Council functions, the targets and outcomes of this strategy should also feed into future revisions of the Corporate Plan and Environment Plans, as well as other documents such as the State of the Environment Report, and Council procedural documents and guidelines.

The implementation of Liverpool's Environment Plan is consistent with and provides opportunities for achieving a range of actions that are outlined in this strategy.

It is intended that the format of this strategy allows for the integration of key components with a number of internal documents and procedures, which by their very nature require input and guidance on matters that affect Biodiversity in the LGA.

7 Updating and Review

To ensure that this document stays current and relevant it will need to be reviewed and updated at key intervals. It has been recommended in the Part B that the document be updated and reviewed every three years. In addition to this the following occurrences should trigger a review of either all or parts of this strategy.

- Changes to relevant State legislation

- Introduction of new legislation relating to the role of local government or natural resource management
- Introduction of new State or local government policies (REPs, SEPPs etc)
- Beginning of a new Corporate Plan for Liverpool City Council

Key terms used in this strategy

Biodiversity (biological diversity) refers to the variety of life: the different plants, animals and microorganisms, the genes they contain and the ecosystem of which they form a part.

Ecologically sustainable development (ESD) refers to development that uses, conserves and enhances the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future can be increased.

Strategies are the mechanisms for carrying of goals and objectives into effect. They are action statements explaining how something is to be achieved. Strategies lead to policies and programs.

Objectives are similar to goals, but are expressed in measurable terms.

Targets are quantifiable performance measures. They are expressed as the value of some indicator or other variable that should be achieved by a given date or other predefined circumstance. Targets are often confirmed by a political or community process.

A full glossary of terms and a list of acronyms used throughout this strategy document can be found in Part D, and should be updated as this document is modified and added to.



Part B: Strategies and Actions

Liverpool City Council Biodiversity Strategy

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Part B. Strategies and Actions

1. Introduction

Part B of this document provides strategies, and actions to achieve the identified objectives. It has been divided into sections that relate to the various roles and responsibilities of Council which have the potential to impact on the viability of Liverpool's biodiversity. These sections are:

- 1 Statutory Planning
- 2 Land and Water Management
- 3 Education
- 4 Resources
- 5 Monitoring

The sections have been designed to be used as stand-alone documents that compliment and integrate with one another to set out a program of actions which will contribute to the continued planning and management of biodiversity in the Liverpool area.

Strategies and actions have been developed through a process of review and audit of best practice and recent innovations from around Australia. They have been tailored to meet the objectives and requirements of Liverpool City, whilst placing emphasis on remaining feasible, efficient and practical.

Actions have been prioritised against identified criteria.

2. Statutory Planning

2.1 Introduction

The statutory planning processes provides an opportunity to incorporate the protection of biodiversity in decision making, to provide benefits to Council, the community, those planning development and to the native plants and animals of Liverpool. Biodiversity management and protection can be incorporated into all aspects of the environmental planning system including master planning, Local Environmental Plans (LEP) and the Development Approval (DA) and Activity Approval (AA) processes.

The various pieces of Commonwealth and State legislation which govern environmental planning in NSW are discussed in a summary document (Statutory Planning Framework) in Part D of this document, and should be referred to for a detailed description of the relevant planning instruments and processes.

The planning process should serve the following functions with respect to biodiversity conservation and management:

- Fulfil ecologically sustainable development responsibilities.
- Provide a decision framework for land use and planning decisions.
- Achieve LGA specific objectives and targets.
- Fulfil statutory obligations (eg TSC Act 1995).
- Facilitate the approvals process.
- Provide a means of educating the public and business.
- Provide transparency and accountability.

The strategies proposed below are designed to assist Council in meeting its legal obligations and tailor its planning processes to get outcomes that will achieve the objectives set out in Part A of this document.

2.2 Strategies

SP1 *Consistently incorporate biodiversity management and protection objectives and mechanisms into the current LEP*

The LEP is the primary planning and land use instrument used by Council. It can be a powerful tool in protecting biodiversity and creating a clear and transparent decision making process. In addition to a zoning system the LEP also includes special provisions for environmentally significant lands (ESL), and determines the permissibility of different types of land use.

Actions

- a. Review and update the objectives of the LEP and each zone in the LEP to ensure that they provide for the protection of biodiversity as well as the maintenance of ecological processes.
- b. Update zoning permissibility tables to reflect biodiversity objective and ecological processes. Do not allow exempt development on land identified in the LEP as environmentally significant (ESL).
- c. Review and update the definitions in the LEP to ensure that they encompass the concepts, terminology and requirements relevant to the protection and management of biodiversity, and that these are used consistently throughout the LEP e.g. update definitions referring to bushland.
- d. Review environmental protection zoning opportunities to provide a zone that has its primary purpose as habitat conservation.
- e. Review zoning of Council land in light of conservation significance assessment mapping (Part E) to identify which areas are of high significance. Where current zoning does not provide adequate opportunities for protection, seek to change to a conservation or environmental protection zone which offer greater opportunities for protection and management.
- f. Review zoning maps across the whole LGA in light of the conservation significance assessment mapping (Part E) to identify lands of high significance. Where current zoning may not provide adequate opportunities for protection, seek to change the zoning wherever possible, to one that offers greater opportunities for protection and management.
- g. Incorporate a trigger to address the objectives, provisions and requirements for offsetting into the LEP.
- h. For new release areas and master planning processes ensure consideration is given to the conservation significance assessment mapping (Part E.), biodiversity planning principles (Part C), targets and offsetting (Part D). Guidelines have been developed for strategic planning to assist in incorporating biodiversity considerations (Part D).

SP2 *Revise the environmentally significant lands (ESL) layer and special provisions in the LEP based on information from this biodiversity strategy*

Actions

- a. Incorporate all areas identified as regional core, local core, support for core, core urban remnant, riparian corridors, regional connectivity, as well as watercourses and wetlands, into the ESL.
- b. Code environmentally significant lands according to their relative conservation value as defined by the conservation significance assessment mapping (see Part E).
- c. Incorporate the objectives and performance criteria for each conservation category into the special provisions of the LEP.
- d. Develop and incorporate the offsetting principles and provisions (see Part C) within the special provisions of the LEP, to apply to lands identified in the updated environmentally significant lands (ESL).
- e. Incorporate ESL categories onto Sn 149 certificates.
- f. Regularly revise and update actions a and b as new information becomes available.

SP3 *Revise and update all other planning instruments used by Council to ensure that they are compatible with the Council's biodiversity objectives and the LEP*

In addition to the LEP, Council uses a range of other planning instruments to achieve land management outcomes. If biodiversity objectives are to be met and certainty is to be provided to the community, then all planning instruments need to be compatible and consistent with Council biodiversity objectives. Mechanisms also need to be found which will provide for development while ensuring that the LGA's biodiversity values are protected and enhanced.

Actions

- a. Update the Natural Assets DCP to incorporate:
 - Description of conservation values and priorities.
 - Offsetting policy procedure to be applied to environmentally significant land (ESL).
 - Riparian corridor and regional connectivity area provisions and landscaping requirements.
 - Provisions for the restoration of degraded areas.
 - Guidance for development and decision making that may impact on biodiversity and environmentally significant lands.
 - Develop provisions in the Natural Assets DCP for the protection and management of wetlands and riparian lands.

- b. Ensure Biodiversity objectives are reflected in Council DCP's, and update or revise S94 plans to reflect amended DCP's and biodiversity objectives.
- c. Liaise with neighbouring councils, PlanningNSW , National Parks and Wildlife Service, Department of Land and Water Conservation (DLWC), and NSW Fisheries to promote the adoption of compatible biodiversity objectives and mechanisms in all regional planning instruments and policies.
- d. For new release areas and master planning processes ensure that the guidelines (Part D) for incorporating biodiversity principles and conservation management objectives are followed.

SP4 *Update and extend the development approval process to ensure biodiversity issues are addressed at all stages of the site based activity and development assessment and approvals process*

In addition to the strategic and regional planning processes biodiversity considerations need to be addressed in the planning, assessment and approvals process for site based developments and activities.

Actions

- a. Develop and apply 'biodiversity development assessment guidelines' to ensure biodiversity issues are addressed early in the development planning process, such as the development of the subdivision proposal or masterplan. - Part 4 of the EP&A Act.
- b. Prepare a set of model conditions for development consents to address protection, maintenance and enhancement of biodiversity values, including a list of ecological objectives that need to be applied to the site by the planner.
- c. Incorporate the development objectives and performance criteria for each conservation category into decision making for Part 4 and Part 5 assessments.
- d. Prepare fact sheet for pre-development application advice
- e. Consider employing a landscape assessment officer that can provide specialist input into the planning, assessment and approvals process
- f. Pursue the location of all stormwater, flooding and associated structures to be offline where possible so they do not impede aquatic ecological processes
- g. Require consultation with the relevant representatives of the Aboriginal community, in recognition of the link between Aboriginal heritage and biodiversity.
- h. The questions of significance of impact on Endangered Ecological Communities (TSC Act) and cumulative impact (under the EP&A Act) are to consider the biodiversity strategy, regional and local conservation significance as well as regional and local targets

SP5 *Acquire and apply accurate vegetation mapping information to planning decisions*

This strategy aims to ensure that the best available data is being used and is made available to decision makers.

Actions

Eco Logical Australia Pty Ltd

Ecological Assessment, GIS, Environmental Management and Planning

Ph - (02) 8536 8600

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- a. Provide electronic and hard copy vegetation remnant and conservation significance mapping (provided in Part E of this strategy) to relevant decision makers in Council to assist with decision making. Provide an appropriate training package on their use and interpretation. Note: mapping needs to be verified for all DAs/AAs.
- b. Provide vegetation mapping (provided in Part E of this strategy) and policies relating to objectives and performance measures (Part D) to DA/AA applicants.
- c. Prepare guidelines and educate staff regarding the use and application of vegetation and conservation significance mapping and databases information.
- d. Work cooperatively with other state agencies and other councils to share vegetation mapping data to ensure all planning processes use the most accurate data available.
- e. Develop a mechanism to ensure that mapping information is updated in response to changing information, including incorporating findings of future studies. Consider adopting NPWS guidelines which are currently in preparation.

SP6 *Identify and develop planning policy and processes to reflect the current statutory and state policy framework that can be used to protect biodiversity*

A wide range of Council policy and processes have the potential to impact on Council's ability to reach its biodiversity objectives. Biodiversity principles can be incorporated into a range of these policies and procedures to ensure a holistic and consistent approach is taken and enable the Council to assist and inform staff, landowners, businesses and developers working in the Liverpool area.

Actions

- a. Develop compliance and auditing process for new development proposals such as including random auditing, incentive systems and self auditing to ensure compliance with the consent conditions. Consider how reporting is addressed. Include audit of offsetting provisions to ensure compliance to actions identified.
- b. Update Council flora and fauna assessment guidelines, and guidelines for the implementation of council's responsibilities under the TSC Act 1995.
- c. Integrate bushfire planning with biodiversity and land use planning.
- d. Explore the use of covenants, which impose certain conditions providing for conservation on a property title, where appropriate. The covenant should include links to management and should be binding on successors.
- e. Work with NSW Fisheries and DLWC to develop targets (km) for stream restoration and viability.
- f. Council to encourage the use of Voluntary Conservation Agreements (VCA) on private land as provided for in the National Parks and Wildlife Act.

3. Land and Water Management

3.1 Introduction

As a land and facilities manager Council has an opportunity to undertake its management planning and operational functions in a way that protects biodiversity and sets an example for other land managers in the area.

The kinds of issues which can impact on biodiversity and which can and should be addressed in management plans and operational plans include:

- Land clearing
- Land fragmentation
- Land degradation
- Weed invasion
- Stormwater runoff
- Decreased water quality
- Soil disturbance
- Pest species
- Changes to the natural flow regime
- Urban and dryland salinity
- Acid sulphate soils

In addition to managing Community and Council lands, Council also has an important role in assisting and contributing to the management of other lands in the area through the planning process, education, provision of resources and assistance. The following strategies aim to incorporate the consideration of biodiversity issues into land management operations and planning for both Council managed land and lands managed by others.

3.2 Strategies

LM1 *Acquire and manage land to proactively protect and restore native vegetation communities and species habitat*

Council can make a significant contribution to the protection and restoration and enhancement of important vegetation communities and wildlife habitat by making some changes to the way it manages the land it is responsible for.

Actions

- a. Prioritise Council's land acquisitions using conservation significance assessment maps from this Strategy (Part E), to give priority to the acquisition of land identified as being of highest conservation significant and/or which contributes to regional connectivity areas and riparian corridors.
- b. Apply the information from the vegetation community maps (Part E) to guide decision making about planting of relevant locally indigenous species on Council land and in regeneration projects.
- c. Use native plants of site specific origin in new plantings wherever possible to maintain genetic integrity. Support the continuation of existing programs of bushland regeneration and keep a record of works on Geographic Information Systems.
- d. Use conservation significance assessment maps (see Part D) to identify priority bushland and corridor areas to be targeted by Council Environment Plan, community bush regeneration projects, and threat management activities.
- e. Protect and rehabilitate roadside reserves, and plant out with native trees and shrubs if native vegetation does not exist or is of poor condition.
- f. Establish Community nursery to collect local seed and provide stock to Council's (and others) rehabilitation programs.
- g. Give priority to undertaking enhancement and maintenance work in areas of environmental significance, as defined by conservation significance mapping (Part E).
- h. Fence off key remnants, particularly Endangered Ecological Communities where appropriate to protect reserves in order to facilitate the protection and/or regeneration of understorey.
- i. Prepare discussion paper on roadside reserves as potential corridors between significant remnants.
- j. Develop guidelines for the restoration of native vegetation communities and species habitat.

LM2 *Prepare plans of management*

Plans of management establish objectives for the future use and management of Council and community lands. By incorporating objectives and actions which will enhance and protect biodiversity Council can not only feel confident that the works it is doing will be having positive benefits, it can also use the plan to help make long term resource allocation decisions. Plans of management are required to be prepared under the NSW Local Government Act 1993.

Actions

- a. Prepare a generic plan of management for all LCC reserves, with specific plans developed if required. These plans of management should identify and address threats to biodiversity within the specific area and within a local and regional context.
- b. Individual Plans of Management to be prepared for community land supporting 'Core – Regional' vegetation (refer to Part E).
- c. Council to include biodiversity management objectives and actions from generic POM in all individual plans of management for the natural areas under its care, control or management, including reserves, riparian corridors, regional connectivity areas, and significant habitat areas.
- d. Prioritise the development of plans of management to ensure that protection and appropriate management of environmentally significant areas is fast-tracked.
- e. Utilise information gained from the vegetation, corridors and conservation significance assessment mapping (Part E) when developing plans of management.
- f. Acknowledge the contribution to biodiversity protection made by the many individual reserves in the LGA and link the objectives of each reserve plan of management to objectives of the region and LGA as whole.

LM3 *Manage fire for the protection of life, property and biodiversity*

The incorporation of biodiversity issues in fire management is a complex issue and should be addressed to minimise ongoing risk to the environment and life and property. Under changes to the *Rural Fires Act* in 2002, the environmental assessment process for hazard reductions has been streamlined. The Draft Bush Fire Environmental Assessment Code, released in January 2003 includes requirements to protect soil, water, threatened species and vegetation from damage by fire.

Actions

- a. Incorporate biodiversity issues into the review and development of bushfire risk management plans (based on fire hazard mapping).
- b. Prepare fire management plans for high risk community lands.
- c. Identify desirable fire regimes (minimum and maximum inter-fire periods) for each vegetation community.
- d. Facilitate and develop links with individuals and agencies carrying out research into the response of species and communities to fire and development of minimum and maximum inter-fire periods.
- e. Identify and map fire history across all bushland, and link to monitoring and reporting.
- f. Consider an environmental burning plan that identifies areas where the inter-fire period has been too long, or may pose as significant threat.
- g. Adopt an environmental management and fire suppression policy for areas where fire has been too frequent or would exceed minimum inter-fire periods if burnt.

- h. Identify and locate fire sensitive species of flora and fauna and develop management recommendations.
- i. Identify urban areas under threat and management strategies to protect these areas without negatively impacting on biodiversity e.g. appropriate building design, fire radiation zones, and asset protection zones. Incorporate into DCP, and educate relevant Council staff
- j. Where measures such as asset protection zones or fire radiation zones are used for bushfire protection for developments, these should be undertaken within land to be developed rather than within lands to be set aside for conservation.
- k. Consider combining Bushcare or bush regeneration programmes with manual fuel reduction to create and maintain fuel reduced zones adjacent to residential developments.

LM4 *Manage urban and paddock trees across the LGA for the protection and enhancement of biodiversity*

Actions

- a. Locate and identify mature trees across the LGA via the Tree Preservation Officer, and develop and maintain a list of these trees on a significant tree register.
- b. Require replacement of trees with native trees in Tree Preservation Orders before any vegetation removal (development conditions).
- c. Offset tree removal with a ratio of 2 new trees of an appropriate native species for every plant removed in urban areas.
- d. All Council landscaping projects to use native species of local provenance.

LM5 *Improve water quality and habitat for aquatic biodiversity*

Water quality impacts on the health and wellbeing of many different plants and animals and is therefore important for the protection and conservation of biodiversity.

Actions

- a. Utilise vegetation offsetting policy to build riparian corridors and buffers.
- b. Work with NSW Fisheries and DLWC to map the threats and obstacles to effective fish passage and initiate actions to improve fish passage.
- c. Retain natural drainage systems and prioritise the restoration of lined stormwater channels to a more natural condition, where it does not conflict with flood management.
- d. Seek funding to replace straight concrete channels with natural creek beds incorporating meanders, channel roughness (pools and riffles), native aquatic vegetation and bordering riparian vegetation.
- e. Improved stormwater drainage, particularly from residential areas surrounding remnant bushland.
- f. Collate baseline data on aquatic habitat and species in Liverpool
- g. Undertake aquatic habitat (in accordance with NSW Fisheries guidelines) and riparian habitat assessments (in accordance with DLWC guidelines) for all strategic planning and development control roles in Council.
- h. Participate in or establish River Management Committees for major regulated river systems and for stressed unregulated river systems.

- i. Develop provisions to maintain, restore and protect riparian corridors (see Part D -Technical Report for design of riparian corridors), giving effect to water quality, river flow and habitat objectives, and maintenance of fish passage in streams.
- j. Protect, maintain and restore natural flow regimes, aquatic connectivity and the lifecycle and movement of aquatic organisms along a watercourse.
- k. Promote and implement water sensitive urban design (WSUD) policy in all maintenance and improvement works, as well as for new projects
- l. Introducing measures to control runoff from road, pavement and community lands systems e.g. increase infiltration
- m. Education of builders and developers to achieve better control of sedimentation by preparing builder education packages and programs, and enforce consent conditions re erosion control
- n. Monitor water quality regularly and utilise biological indicators of pollution in accordance with EPA standard guidelines
- o. Review and improve management mechanisms to control salinity, nutrients and pesticides
- p. Council to prepare guidelines for achieving best practice stream design, construction and maintenance
- q. Develop a riparian lands management strategy and accompanying suite of actions. The riparian lands management strategy should address issues such as stream connectivity, setbacks for development, buffer widths, creek crossing design and landscaping guidelines
- r. Pursue the relocation of all online structures so they do not impede aquatic ecological processes

LM6 *Continue, expand and adjust current weed management strategy*

Noxious and environmental weeds pose a significant threat to native flora and fauna. They compete with native species and are often unsuitable habitat or food for native animals. The control of weeds is an ongoing problem however if conducted in a strategic manner real benefits for native plants and animals can be achieved.

Actions

- a. Prioritise weed control programs to give top priority for bush regeneration monitoring and maintenance programs to those areas identified by the conservation significance assessment mapping (Part E).
- b. On Council managed land, focus noxious weed control on fulfilling Council's obligations under the *Noxious Weeds Act 1993*.
- c. Develop a procedure that ensures that clearing notices do not adversely impact on lands that are known to contain EEC's, threatened flora or fauna or other lands identified as significant by this biodiversity strategy.
- d. Conduct inspections to identify the presence of noxious weeds within the LGA. Issue notices for weed control on privately owned land, in accordance with the *Noxious Weeds Act 1995*. Follow up with further inspections.
- e. Make information on the impacts of introduced species available to the public through the State of the Environment Report, Landscape Development Control Plans, and distributing other educational material.

- f. Advise property owners of their responsibilities to remove noxious weeds, and include information about Liverpool's environmental weeds with this advice.
- g. Developers to provide integrated weed management strategies for new developments.
- h. Undertake roadside weed control programs to prevent roadside weeds spreading to adjoining bushland, and seek partnerships with other roadside managers eg. RTA.
- i. Encourage and educate regarding proper disposal of garden refuse.
- j. Collaborate closely with the NSW Agriculture with respect to pest control.
- k. Review the objectives and activities in the NSW Weed Strategy (Dept of Agric., 2001) and consider incorporating compatible objectives and actions into Councils weed plans.
- l. Seek funding from the NSW Agriculture for developing a strategy for weed management.

LM7 *Continue, expand and adjust current feral animal control strategy*

Feral animals compete with native animals and are often predators of native animals. They have been recognised as a potential contributor to extinction of some native animals. A coordinated approach to the control of feral animals will have positive benefits for biodiversity.

Actions

- a. Liaise with RLPB and NPWS to identify problem feral species in the Liverpool area— eg fox, cat etc
- b. Liaise with animal ethics organisations to identify best practice/most effective control methods.
- c. Develop and maintain partnerships with the Rural Lands Protection Board (RLPB), NSW Department of Agriculture, NPWS and landholders regarding feral animals.
- d. Promote responsible ownership of companion animals such as dogs and cats, thereby minimising the impact of animals on native species while also recognising the benefits they provide.
- e. Prepare a companion animals management plan.

LM8 *Evaluate, develop and implement operational practices that protect and enhance biodiversity values on Council lands*

Actions

- a. Develop policies and procedures to preserve and promote native vegetation along roadsides.
- b. Sweep streets only where necessary, i.e. under deciduous trees or where the street does not slope so leaf litter and other material accumulates.
- c. Establish no mow zones on Council lands with potential to enhance natural and habitat values, and to encourage regeneration.
- d. Establish no go zones on Council lands by fencing in a strategic manner to reduce the profusion of tracks, exclude dogs, cats and pests, motorbikes, bikes, and lawnmowers etc. Fence off stands of native tree species to encourage regeneration
- e. Avoid removing large trees which may be important for birds and animals as shelter and nesting sites

- f. Identify suitable areas for wetland treatment systems and explore funding opportunities
- g. Council to prepare Best Practice Bushland Management Guidelines to form the basis for the management of Council reserves, based on guidelines from the Australian Association of Bush Regenerators
- h. Prepare guidelines for road design and construction

LM9 *Adopt and support community programs that encourage and assist landholders in managing their land for the conservation of biodiversity*

- a. Continue to encourage and support the development of Landcare and Bushcare groups
- b. Investigate the implementation of the joint agency 'Farming for the future' program to encourage sustainable farm and land management
- c. Seek funding from the state and federal governments to fund community conservation projects
- d. Support landowners in rural and semi rural areas to develop property management plan which contain actions that will contribute to biodiversity conservation

LM10 *Develop an incentives scheme to assist and encourage land managers to implement ecologically sustainable practices for the conservation of biodiversity*

- a. Investigate the establishment of a grants scheme that would provide small grants to landowners with approved land management plans, to undertake actions which will contribute to biodiversity conservation
- b. Investigate the use of rate rebates to landholders who have entered into voluntary conservation agreement (NPW Act) or have a covenant or binding management agreement that will contribute to biodiversity conservation
- c. Provide information to land managers regarding best practice sustainable land management

4. Education

4.1 Introduction

Education plays an important role in the implementation of this biodiversity strategy. By increasing awareness, understanding and skills of our community, they will be able to make more informed choices about their behaviour and begin to change their behaviours so as to reduce their impact on biodiversity.

The strategies presented are targeted at both Council staff and the community. Some of the education strategies are broad in approach while some are focused on specific areas, audiences or issues. Education strategies have the potential to provide capacity building within the community and Council to make a long-term commitment to managing land and resources in ways that will protect and conserve the biodiversity of Liverpool.

4.2 Strategies

E1 *Undertake activities aimed at raising the awareness of the community about the importance and conservation of biodiversity*

Actions:

- a. In order to raise awareness of biodiversity in the community and at Council, publish a flora and fauna book, for use by the local community and Council staff. Include and highlight threatened plants and animals.
- b. Develop the link between effects on threatened species, habitat and everyday activities such as land clearing, pollution etc. as a basis for education about how everyday activities affect biodiversity.
- c. Publish a map of the vegetation that existed in Liverpool "then and now".
- d. Prepare education material to highlight the various vegetation communities for the region, or specific areas, to be used as a catalyst for awareness raising and behavioural change.
- e. Provide advice via various mediums to residents on weed control, appropriate garden planting, aquatic and terrestrial habitat values including bush rock and dead trees, and the impact of rubbish dumping.
- f. Provide information on the impacts of introduced species to the public using appropriate mechanisms.
- g. Maximise the use of the internet and intranet in order to effectively disseminate educational information and target specific groups.
- h. Consider installing road signage identifying endangered communities or areas of significant vegetation.

E2 *Undertake and support programs that build the skills of the community in relation to actions that will help conserve biodiversity*

Actions:

- a. Continue and expand on co-operative arrangements with Council and community conservation groups, building on and supporting the work undertaken via the Environment Plan process.
- b. Support and develop Bushcare and Landcare groups for areas that have been identified as significant (subject to funding), building on and supporting the work undertaken in the Environment Plan process.
- c. Provide information to the community on what they can do to promote biodiversity in their backyards this could include the adoption of the NPWS "Backyard buddies" program.
- d. Undertake community biodiversity surveys to increase the level of community participation and involvement in Bushcare and the environment generally (refer to NPA Manual).
- e. Work with local nurseries to ensure that local indigenous species are available for planting.
- f. Investigate a seed bank via local bush regeneration groups and liaison with groups such as Greening Western Sydney Program and Greening Australia
- g. Support biodiversity studies in the educational curricula.
- h. Develop a media profile for biodiversity issues to promote interest and enthusiasm amongst the community.

E3 *Develop training and education resources and programs to improve Council staff understanding of biodiversity management issues and actions*

Actions:

- a. Place this strategy and the resource documents that support it on Council's intranet.
- b. Provide training for staff on the relevant sections of the Strategy to their position.
- c. Develop a training resource to inform staff about the endangered and threatened plants and animals in Liverpool and their role in protecting them.
- d. Creating an 'on-ground' guide for Council maintenance staff. This could include a list of key species, identification tips and protection measures.
- e. Educate relevant staff on identifying soil types and microhabitat conditions that would help them to make better decisions about what and how to plant.
- f. Continue to inform planning team on changes to biodiversity related legislation and its relationship with development application approval process.
- g. Provide ongoing training to enforcement officers regarding a range of biodiversity and related issues.
- h. Develop and implement a Councillor biodiversity awareness program.
- i. Incorporate sustainability awareness within Council's staff induction training.
- j. Link into the 'sustainability team' as it develops to share ideas and develop targeted material for staff.
- k. Provide training to enable staff to recognise the broader inter-relationship between Aboriginal heritage values and biodiversity.

E4 *Provide tailored information to key audiences whose activities may impact on biodiversity*

Actions:

- a. Provide information to developers, landholders and real estate agents on this biodiversity strategy and related policies.
- b. Continue to educate builders and developers to achieve better control of sedimentation from building sites using existing Council information.
- c. Promote educational material that encourages businesses to take stronger ownership role for adjoining public lands.
- d. Use various mediums to raise awareness and promote specific issues e.g. adverse impacts of human activities on bushland and bushland values.
- e. Identify existing and new education programs/information regarding maintaining healthy catchments and make these available to landholders with riparian areas and/ or wetlands on their land.

E5 *Gather information about the community's level of knowledge, understanding and current behaviour to inform the design of tailored education programs*

Actions:

- a. Conduct survey of council residents to identify knowledge about behaviour that impacts on biodiversity – eg litter stormwater, illegal clearing etc. and feed this into education material.

- b. Work with local Aboriginal people to document their knowledge about the biodiversity of the LGA, and when appropriate incorporate this into community education programs.
- c. Ensure that where appropriate that the material produced is provided to meet the needs of particular non English speaking background communities.

5. Resources

5.1 Introduction

A strong resource base is an essential element of this biodiversity strategy. Resources can be people and their skills and knowledge, as well as funding grants, or materials.

For the purposes of this strategy, resources have been divided into the following:

- Staff resources
- Community resources
- Information (data)/other agencies/institutions
- Funding
- Materials

The following strategies aim to develop an approach that makes the most of all these resources in order ensure that this biodiversity strategy and it's actions are appropriately funded and resourced and can continue to make a positive contribution to the overall aims.

5.2 Strategies

R1 *Preparation and implementation of data management strategy*

Actions:

- a. Provide access to biodiversity data for Councils daily planning, assessment and management functions via Council intranet, provision of maps from this biodiversity strategy (Part E) and appropriate training.
- b. Council to develop a process for storing, handling and accessing information that is kept up to date and relevant.
- c. Consider incorporating site specific assessment data into a layer of additional biodiversity information (providing the data has been collected to a standard format – outlined in proposed updated biodiversity assessment guidelines)
- d. Provide access to biodiversity data as a resource to community programs and funding applications.

R2 *Develop active partnerships with the general community*

Actions:

- a. Establish a biodiversity working group to be a conduit for community input and feedback on biodiversity protection and enhancement programs and promote the ownership of biodiversity values within the community. The group could include members of relevant government organisations to provide input and guidance and respond to issues. This may be a role to be fulfilled by an Environment Plan Advisory Panel.
- b. Approach an appropriate person to become Biodiversity Patron and be the public face of the strategy.
- c. Introduce a system of environmental awards for the community, targeting those who actively participate in identified programs.
- d. Enhance the social aspect of Bushcare activities that involve biodiversity by encouraging field days, picnics and outings for interested parties.
- e. Setup a sustainability team consisting of members from a range of disciplines within Council to regularly discuss issues, provide recommendations and input into projects.

R3 *Develop active partnerships with government agencies and authorities that can enhance biodiversity outcomes*

Actions:

- a. Promote co-operative working arrangements with other agencies and authorities including ongoing participation in regional biodiversity planning forums and agendas, and active engagement with neighbouring councils.
- b. Form a biodiversity working group with neighbouring councils.

- c. Establish an Environmental Advisory Panel that includes representation from the Liverpool Community

R4 *Develop active partnerships with local schools and tertiary institutions that can enhance biodiversity outcomes*

Actions:

- a. Promote biodiversity outcomes through initiating a partnership process with local schools and universities in the region.
- a. Undertake joint research and/or monitoring projects with Universities in the region.

R5 *Develop active partnerships with local environmental groups*

Actions:

- a. Develop a priority list of works with local groups that are interested in improving biodiversity by programming in with strategic rehabilitation programs, via the Advisory Panel subcommittee.

R6 *Develop partnerships with local Aboriginal Land Councils*

Actions:

- a. Develop a process that will assist in forming a partnership with Local Aboriginal Land Councils to provide additional focus to the management of biodiversity and ensure that significant Aboriginal sites are protected.

R7 *Develop active partnerships with local business and commercial enterprises that can enhance biodiversity outcomes*

Actions:

- a. Negotiate initiatives that allow part of their sites to be used for planting, re-creation of habitat or provision of nesting opportunities for birds.
- b. Develop an information kit that encourages the formation of Bushcare groups based on work colleagues as members, looking after local or on-site vegetation. This can be achieved through the Environment Plan.
- c. Establish an environmental awards program that recognises enterprises in the LGA that have made positive achievements for the environment.
- d. Develop co-operative arrangements with local garden centres and nurseries.

R8 *Continue to seek grants and funding from various sources*

Actions:

- a. Explore the development of a Western Sydney Vegetation Management Trust to manage funds directly for biodiversity management.
- b. Continue to seek out and maximise the amount of funding available through grants from the Natural Heritage Trust.
- c. Continue to seek out and maximise the amount of funding available through the State government
- d. Other funding could also be sought from business through various partnerships, sponsorships of various programs
- e. Dispose of unwanted Council lands to assist in funding the purchase of lands with high conservation value

R9 *Consider the introduction of a development levy.*

Actions:

- a. Investigate basing the levy on a pre-defined rate for new residential rezoning.
- b. Develop a programme of funding to ensure that all levy monies go towards the implementation of this biodiversity strategy and Environment Plan.
- c. Investigate options for general revenue and Section 94 contributions to maximise the amount of funding that can be spent on environmental works.

6. Monitoring

6.1 Introduction

Monitoring strategies are essential to assess the effectiveness of the strategies, and more importantly, assess the impact of the strategies on biodiversity. Monitoring and ongoing evaluation assists Council to continually improve the efficiency and effectiveness of its programs and incorporate emerging technologies, best practice and new approaches. It also enables them to be responsive to changes in the landscape, natural disasters and regional issues.

6.2 Strategies

M1 *Develop core indicators of biodiversity in Liverpool*

Actions:

- a. Identify and develop key indicators, e.g. vegetation cover and condition, flora and fauna, pest species
- b. Map changes in vegetation (clearing, fire, regeneration, re-vegetation) to compare over time

M2 *Development of a Monitoring Strategy*

Actions:

- a. Implement the processes recommended in this strategy with regards to updating actions and guidelines so that the Strategy is up-to-date and relevant
- b. Feed monitoring into the Data Management Strategy. Include monitoring of targets, offsetting provisions, etc

M3 *Support the SOE process*

Actions:

- a. Incorporate indicators into the SOE reporting
- b. Regularly review and report the results in Councils State of the Environment (SoE) Report
- c. Review SoE report to ensure that it ties in with Councils overall management plan
- d. Provide annual reporting to the Environment Advisory Panel

M4 *Carry out comprehensive review of the vegetation mapping every 3 years*

Actions

- a. Vegetation mapping should be updated using high-resolution aerial photography (all the same date) to identify the extent of vegetation in the region, every 3 years. Consider the incorporation of related values and issues such as cultural heritage, salinity, etc.

M5 *Review this biodiversity strategy every 3 years*

Actions:

- a. Review of all strategies and targets in this biodiversity strategy every 3 years
- b. Review all strategies to Incorporate changes in policy and legislation where applicable
- c. Review this Biodiversity Strategy to incorporate aquatic biodiversity issues and planning and management requirements
- d. Set-up mechanisms to evaluate the effectiveness of strategies and the trends towards or away from set targets

M6 *Review data and mapped products to facilitate decision making*

Actions:

- a. Review of Biodiversity Strategy mapped products, to incorporate updated conservation assessment, DLWC stream classification, aquatic data and threatened species records (consider the possibility of habitat mapping) over time. Produce a simplified spreadsheet summary of data and products available to staff. Consider the incorporation of cultural values to the mapping products.

7. Prioritisation of Strategies and Actions

The following criteria were considered when in prioritising strategies and actions Liverpool Council to consider when prioritising the strategies within each theme of the draft Liverpool Biodiversity Strategy:

- Strategy addresses more than one objective
- Level of ecological risk of not doing it now
- Provide a lasting and long -term outcome.
- Funding and resources are available for implementation
- Community backing and/or focus
- Saves existing biodiversity or stops loss of existing vegetation
- Positively impacts **critically** endangered communities or species

All strategies and actions have been ranked in order of priority and importance. They were each classed as either high, medium or low for both the order in which they should be done and their contribution to the achieving the overall objectives of this Strategy.

The following table gives relative rankings for each action within each section of in Part B

7.1 Strategic Planning Action Prioritisation Table

1= Most urgent

H= High

M= Medium

L=Low

6 = Least urgent

Priority	Strategy	Action	Time priority	Significance of outcome
1	SP1	d	H	H
1	SP2	a	H	H
1	SP2	b	H	H
1	SP2	c	H	H
1	SP2	d	H	H
1	SP3	a	H	H
1	SP4	h	H	H
1	SP1	g	H	H
2	SP1	a	H	M
2	SP1	b	H	M
2	SP1	c	H	M
2	SP1	e	M	H
2	SP1	f	M	H
2	SP1	h	M	H
2	SP4	a	M	H
2	SP4	g	M	H
2	SP5	a	H	M
3	SP3	b	M	M
3	SP3	c	M	M
3	SP3	d	M	M
3	SP4	b	M	M
3	SP4	c	M	M
3	SP4	f	M	M
3	SP5	c	M	M
3	SP5	d	M	M
3	SP6	a	M	M
3	SP6	b	M	M
3	SP6	c	M	M
3	SP6	d	M	M
3	SP6	e	M	M
4	SP2	e	M	L
4	SP2	f	L	M
4	SP4	d	M	L
4	SP4	e	L	M
4	SP5	b	M	L
4	SP5	e	L	M
4	SP6	f	L	M

7.2 Land and Water Management Actions Prioritisation Table

1= Most urgent

6 = Least

urgent

H= High

M= Medium

L=Low

Priority	Strategy	Action	Time priority	Significance of outcome
1	LM10	a	H	H
1	LM2	a	H	H
1	LM5	n	H	H
1	LM5	q	H	H
1	LM6	c	H	H
1	LM9	c	H	H
1	LM9	d	H	H
2	LM1	d	M	H
2	LM1	g	M	H
2	LM1	j	M	H
2	LM10	b	M	H
2	LM2	b	H	M
2	LM3	a	M	H
2	LM3	b	H	M
2	LM3	c	M	H
2	LM3	h	M	H
2	LM3	i	H	M
2	LM4	b	H	M
2	LM4	c	M	H
2	LM5	a	M	H
2	LM5	c	M	H
2	LM5	f	H	M
2	LM5	o	M	H
2	LM6	a	H	M
2	LM8	e	M	H
2	LM8	g	M	H
2	LM9	a	H	M
3	LM1	b	M	M
3	LM1	c	M	M
3	LM1	f	M	M
3	LM1	h	M	M
3	LM10	c	M	M
3	LM2	c	M	M
3	LM2	e	M	M
3	LM3	e	M	M
3	LM4	d	M	M
3	LM5	b	M	M
3	LM5	e	M	M
3	LM5	j	M	M
3	LM5	l	M	M

Priority	Strategy	Action	Time priority	Significance of outcome
3	LM5	m	M	M
3	LM5	p	M	M
3	LM5	r	M	M
3	LM6	b	M	M
3	LM6	g	M	M
3	LM6	h	M	M
3	LM6	j	M	M
3	LM6	k	M	M
3	LM6	l	M	M
3	LM7	a	H	L
3	LM7	c	M	M
3	LM7	d	M	M
3	LM7	e	M	M
3	LM8	c	M	M
3	LM8	d	M	M
3	LM8	f	M	M
3	LM9	b	M	M
4	LM1	a	L	M
4	LM1	e	L	M
4	LM2	d	M	L
4	LM2	f	L	M
4	LM3	d	M	L
4	LM3	f	L	M
4	LM3	g	L	M
4	LM3	j	L	M
4	LM4	a	L	M
4	LM5	d	L	M
4	LM5	g	L	M
4	LM5	i	M	L
4	LM5	k	M	L
4	LM6	d	M	L
4	LM6	f	L	M
4	LM6	i	M	L
4	LM7	b	L	M
4	LM8	a	M	L
4	LM8	b	L	M
4	LM8	h	L	M
5	LM1	i	L	L
5	LM3	k	L	L
5	LM6	e	L	L

7.3 Education Actions Prioritisation Table

1= Most urgent
6 = Least urgent

H= High M= Medium L=Low

Priority	Strategy	Action	Time priority	Significance of outcome
1	E2	b	H	H
1	E3	b	H	H
1	E4	e	H	H
2	E1	d	M	H
2	E1	f	M	H
2	E3	a	H	M
2	E4	b	M	H
2	E5	b	M	H
3	E1	g	M	M
3	E1	h	M	M
3	E2	a	H	L
3	E2	c	M	M
3	E2	d	M	M
3	E2	e	M	M
3	E2	f	M	M
3	E2	g	M	M
3	E3	c	M	M
3	E3	d	M	M
3	E3	f	L	H
3	E3	k	M	M
3	E3	g	M	M
3	E4	c	M	M
3	E5	a	M	M
3	E5	c	M	M
4	E1	b	M	L
4	E1	c	M	L
4	E1	e	L	M
4	E2	h	M	L
4	E3	e	L	M
4	E3	h	L	M
4	E3	i	M	L
4	E3	j	L	M
4	E4	a	L	M
5	E1	a	L	L
5	E4	d	L	L

7.4 Resourcing Action Prioritisation Table

1 = Most urgent
6 = Least urgent

H= High

M= Medium

L=Low

Priority	Strategy	Action	Time priority	Significance of outcome
1	R1	d	H	H
1	R2	a	H	H
1	R2	e	H	H
1	R3	a	H	H
1	R8	b	H	H
1	R8	c	H	H
2	R1	a	H	M
2	R2	b	H	M
2	R3	b	M	H
2	R3	c	H	M
2	R8	a	M	H
3	R1	c	M	M
3	R2	c	M	M
3	R2	d	M	M
3	R4	a	M	M
3	R5	a	M	M
3	R6	a	M	M
3	R7	a	M	M
3	R7	d	M	M
3	R8	e	M	M
3	R9	a	M	M
3	R9	b	M	M
3	R9	c	M	M
4	R1	b	L	M
4	R4	b	L	M
4	R7	b	L	M
4	R7	c	L	M
4	R8	d	L	M

7.5 Monitoring Action Prioritisation Table

1 = Most urgent
6 = Least urgent

H= High M= Medium

L=Low

Priority	Strategy	Action	Urgency	Significance of outcome
1	M5	c	H	H
1	M6	a	H	H
2	M4	a	M	H
2	M5	b	M	H
2	M5	d	M	H
3	M1	a	M	M
3	M2	a	L	H
3	M2	b	M	M
3	M3	a	M	M
3	M3	b	M	M
3	M5	a	L	H
4	M1	b	L	M
4	M3	c	L	M
4	M3	d	M	L



Part C: Principles, Justification and Policies

Liverpool City Council Biodiversity Strategy

August 2003



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Part C. Principles, Justification, and Policies

1. Introduction

Part C of this biodiversity strategy provides some background information, context, justification and policy framework for the initiatives and strategies referred to in Part B. Part C sets out:

1. Principles and justifications
 - A definition of biodiversity
 - The reasons for protecting biodiversity
 - The legislative and policy framework which exists regarding biodiversity protection
 - Justifications for the approach taken in this strategy on key initiatives
2. New policies for Liverpool
 - Conservation Targets
 - Habitat Offsetting
 - Corridors and Connectivity
3. Conservation Significant Classifications
 - Definitions
 - Management objectives

2. Principles and justifications

2.1 What is Biodiversity

The word biodiversity is derived from the phrase biological diversity. It has been in common use since the 1980s.

The *National Strategy for the Conservation of Australia's Biological Diversity* (DEST 1996) defines biodiversity (or biological diversity) as:

The variety of all living things, including plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part. It is not static, but is constantly changing: it is increased by genetic change and evolutionary processes and reduced by processes such as habitat degradation, population decline, and extinction.

This is the definition adopted for this biodiversity strategy.

The concept of biodiversity emphasises the interconnectedness and interdependence of all life on earth and can be considered at three levels; species diversity, ecosystem diversity and genetic diversity. These are briefly explained below:

- **Genetic Diversity:** A range of genetic differences within a species is referred to as genetic diversity - the variety of genetic information contained in all of the individual plants, animals and micro-organisms that inhabit the earth. Individual genes are the basic unit of biodiversity, and explain why there is so much variation amongst individuals of a particular species. It explains, for example, why some people have brown eyes and others have blue eyes.
- **Species Diversity** – This refers to the number of different types of species on earth. It is the most common way people think about biodiversity. So far, only about 1.7 million species have been classified, however there are believed to be many times more species in existence.
- **Ecosystem diversity** - The variety of ecosystems in an area, including the variety of habitats, biotic communities and ecological processes make up the Ecosystem diversity. Australia has a broad range of ecosystem types ranging from the Snowy Mountain grassy meadows and Wet Tropic rainforests, to the sea grass beds found in many of our coastal waters (DEST, 1996; CBN, 2000).

This biodiversity strategy is primarily concerned with the biodiversity (native plants and animals, genetic variations, populations, ecosystems and ecological processes) found within or dependent on the Liverpool LGA. It does however recognise that there are factors and forces that influence the biodiversity in this area that are outside the geographic area of the Liverpool LGA. Likewise it recognises that the biodiversity of the Liverpool LGA contributes to and influences the biodiversity of surrounding regions, the State and in some cases the nation and planet.

2.2 Why protect Biodiversity?

There are three main reasons (legal, ecological and social) for endeavouring to protect the biodiversity of the Liverpool area. These are to:

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- Meet and fulfil international, national, state and local legislative and policy requirements
- Sustain biological resources and life support systems of earth, and provide for adaptation to change
- Meet social, cultural and economic needs and goals, such as to provide for ecologically sustainable development.

The *National Strategy for the Conservation of Australia's Biological Diversity* (DEST 1996) list a number of reasons why it is important to protect and conserve Australia's biological diversity. These include:

- Biodiversity provides our food, many medicines and industrial products
- An environment rich in biological diversity offers the broadest array of options for sustainable economic activity, human welfare and change
- Biodiversity is essential to the maintenance of ecological services such as the water and nutrient cycles
- Protecting biodiversity will help avoid the rising costs associated with repairing land degradation
- Biodiversity contributes to social, cultural, artistic and spiritual richness of society and communities.

Biodiversity is vital to maintaining clean air and water, and fertile soils. It also provides opportunities for recreation, tourism, scientific research and education. Biological diversity is well recognised as fundamentally important in allowing ecosystems and species to withstand change and disturbances.

Overall, the protection of biodiversity aims to protect processes, systems and habitat and reduce the rate of extinction of all species.

2.3 Legal Framework

The policy and legislative requirements to protect and conserve biodiversity are contained in a wide range of legislation, international conventions and policy documents. A summary of these is provided in Part D in the section titled Statutory Framework.

The legal framework is contained in legislation, policy and planning instruments from the different jurisdictions. These are

- International
- Commonwealth
- State
- Regional
- Local

A wide range of legislation dealing with resource use and protection, planning, administrative processes and governance effects and determine the priorities and opportunities for managing and conserving biodiversity. Some legislation and policy deals specifically with the management and protections of biodiversity, such as:

- Biodiversity Protection and Conservation Act (1999)
- National Parks and Wildlife Act (1967)
- Threatened Species Conservation Act (1997)
- The National Strategy for the Conservation for Australia's Biological Diversity (1997)
- NSW Biological Strategy – Biodiversity, Life's Variety (1999)

Other legislative mechanisms deal with broader environmental principles such as ecological sustainability and sustainable development. Examples of Acts which particularly influence the role of local government in protecting biodiversity include:

- Environmental Planning and Assessment Act (1979)
- Local Government Amendment (Ecologically Sustainable Development) Act 1997

The Local Government Act (1993) sets out the charter for local government in Chapter 3 Part 8. This charter contains a number of elements which give local government a direct role in, and responsibility for the protection and management of biodiversity within their area.

Liverpool City Council has a role in developing, administering and enforcing a range of plans, regulations and policies which can be used to manage, protect and conserve biodiversity. The full list of these is set out in the Statutory Planning section in Part D of this strategy. Examples of these include:

- Liverpool City Council Local Environmental Plan (LEP)
- Development Control Plans
- Tree Preservation Orders

The Liverpool City Council Corporate Plan 2000-2003 identifies the importance of protection and enhancement of Liverpool's areas of bushland, waterways, scenic corridors and networks of open space. The principles and objectives of this Plan provide an important link between the role of this biodiversity strategy and Council's other environmental and sustainability objectives.

2.4 ESD and Biodiversity Protection Principles

Ecologically sustainable development (ESD) means using, conserving and enhancing our natural resources so that ecological processes on which life depends, are maintained, and the total quality of life, now and in the future, is improved. ESD improves the quality of life for those of us alive now and also for future generations.

Ecologically sustainable development requires the effective integration of economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

(a) the precautionary principle-namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental

degradation. In the application of the precautionary principle decisions should be guided by:

- (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment
- (ii) an assessment of the risk-weighted consequences of various options

(b) inter-generational equity, namely that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations,

(c) conservation of biological diversity and ecological integrity, namely that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) improved valuation, pricing and incentive mechanisms, namely that environmental factors should be included in the valuation of assets and services, such as:

- (i) polluter pays - that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
- (ii) the user of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
- (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

(Extract from Department of Local Government, 1999)

The *Biodiversity Planning Guide for NSW Local Government (NPWS, 2001)* highlights a number of biodiversity planning principles that can be used as part of an overall strategy for the Liverpool LGA to manage conservation values. The set of biodiversity protection principles in this strategy has been developed from a review of a wide range of literature and from accumulated experience. They are derived from the science of ecology and conservation biology.

These principles have informed the development of the strategies and actions set out in Part B of this strategy. They should also inform Council's decision-making on all operational and planning matters that may have an impact on biodiversity. These principles should inform the way the strategies and actions in Part B are implemented, and should be incorporated into future Liverpool City Council Corporate Plans.

The principles include:

- Maintain and protect naturally occurring ecosystems, communities and species
- Protect and manage all ecosystem types
- Protect and adequately manage areas with high conservation value
- Minimise negative impacts through good planning, design and management

- Avoid fragmentation
- Restore lost biodiversity where practical
- Reduce threatening processes
- Protect, enhance and promote the sustainable management of significant remnants
- Identify less sensitive areas which may be suitable for development
- Create, enhance and protect connectivity within the natural landscape
- Provide for the protection and management of natural areas in the design of developments.
- Reduce edge to area ratios of remnants by consolidating boundaries, increasing the size of remnants and building connectivity between remnants
- Recognise the different habitat requirements of individual species and vegetation communities
- Promote native species and avoid introducing non-native species across the landscape
- The co-ordination of all levels of government, resource users, and the community in general, is critical to the conservation of biological diversity
- The conservation of biodiversity in a local government area is affected by the actions of surrounding local government areas and requires action and communication extending beyond the LGA

2.5 Role of Vegetation Management and Protection

A wide range of factors influence and contribute to the management and protection of biodiversity. A consistent theme in the principles listed above is the need to protect and manage vegetation.

The strategy has adopted vegetation management, protection and conservation as a surrogate for protection of wider biodiversity values and ecological processes. By protecting and managing the range of vegetation communities within Liverpool LGA, it can be reasonably assumed that the habitat needs of the species and their ecological functions will also be protected, thereby contributing to the overall protection and management of biodiversity.

Protecting and managing native vegetation communities, is considered to be a fundamental requirement in protecting biodiversity. It is also an area where Council has a distinct and clearly defined role. By placing a priority on the protection and management of vegetation within Liverpool LGA, Council is providing an efficient and effective mechanism for achieving the broader biodiversity conservation goals.

Vegetation protection and management will not in and of itself provide for all of the outcomes required. It will however facilitate meeting many of Council's responsibilities and support other regulatory mechanism such as provisions in the Threatened Species Conservation Act. It is therefore recommended that in carrying out their roles and responsibilities. Council needs to be satisfied that the full range of biodiversity and ecological process have been addressed.

3. Conservation Significant Classifications

All the native vegetation in Liverpool has been mapped (Map 4 in Part E of this strategy) and given a conservation significance classification. The process used to do this is detailed in the technical report provided in Part E.

3.1 Descriptions of classifications

The following are brief descriptions of the three land classifications produced by this conservation significance assessment.

3.1.1 Core Areas

Core – Regional

Core – Local

Core – Urban Remnants

Core areas are the areas of highest conservation value. They represent areas where species or communities are at imminent risk of extinction, or large areas within the region that constitute the backbone of a viable conservation network across the landscape.

Where communities are fragmented such that most of what remains exists as scattered trees over urban areas, these patches of scattered trees are also considered to be core (Core – Urban Remnants).

The unpublished NPWS Conservation Significance assessment across the region included Core vegetation (relates to Regional Core in this assessment) and Urban Remnants. The Local Core category was added to include smaller patches of Endangered Ecological Communities than the Regional Core. This decision was based on the fact that some 25% of EEC area across the study area occurs in patches less than 10 hectares in size. It was felt that these smaller patches have local significance.

The table below shows the vegetation included in 'regional core' lands. See Technical Report (Part E) for definition of condition class.

Condition	Community	Patch Size	Connectivity
ABC	Endangered Ecological Communities (Critically Endangered*)	all	
	Endangered Ecological Communities (Other)	>10 ha	
	Non Listed Communities	>100ha	
	Non Listed Communities	<100ha	Adjacent to other Core
TX, TXR	Endangered Ecological Communities (Critically Endangered)	all	
Any	Freshwater Wetlands	all	

The table below shows the vegetation included in 'local core' lands.

Condition	Community	Patch Size	Connectivity
ABC	Endangered Ecological Communities (Other)	2-10 ha	

The table below shows the vegetation included in urban remnant.

Condition	Community	Patch Size	Connectivity
TXU	Endangered Ecological Communities (Critically Endangered)	all	

3.1.2 Support for Core

Support for core are areas within the region that provide a range of support values to the critically endangered and core habitat, including increasing the size of and buffering these areas.

The focus is to identify priority areas for restoration work in order to enhance the ecological functions and contribution of the areas to the conservation of biodiversity values of the region.

The table below shows the vegetation included in 'Support for Core' lands.

Condition	Community	Patch Size	Connectivity
TX, TXR	Endangered Ecological Communities (Other)	all	Adjacent to Core
	Non Listed Communities	all	Adjacent to Core

3.1.3 Other Native Vegetation

The remainder of native vegetation has been classified as Other Native Vegetation. Generally, these are small, isolated and poor quality remnants.

3.2 Management objective for classifications

A set of management objectives have been developed for each of the conservation classifications. To help ensure that the lands are managed for their biodiversity values, performance measures have also been adopted. These are set out below.

3.2.1 Regional Core Management

These lands are considered significant to achieving State biodiversity conservation and management goals.

Objective

- To protect remaining 'Regional Core' vegetation,
- No clearing, trading or offsets permitted unless considered to be a social and economic benefit of state significance,
- To protect and restore buffer areas to 'Regional Core' vegetation, and
- To protect the contribution 'Regional Core' vegetation has to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to 'Regional Core' lands where that action:

- a) leads to a long-term adverse affect on Regional Core vegetation, or
- b) reduces the extent of Regional Core vegetation, or
- c) fragments an occurrence of Regional Core vegetation, or
- d) adversely affects habitat critical to the survival Regional Core vegetation, or
- e) modifies or destroys abiotic factors (such as water, nutrients, or soil) necessary for the survival of Regional Core vegetation, or
- f) results in invasive species that are harmful to Regional Core vegetation becoming established in an occurrence of these lands, or
- g) diminishes the capacity of a buffer area adjacent to Regional Core vegetation, or
- h) adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to Regional Core vegetation where the requirements under the TSC Act have not been met.

3.2.2 Local Core Management

These lands are considered significant to achieving local conservation and management goals.

Objectives

- No net loss of 'Local Core' vegetation,
- Some flexibility for trading and offsets,
- To protect the viable remnants of 'Local Core',
- To protect the contribution 'Local Core' lands have to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to Local Core lands where that action:

- a) leads to a long-term adverse affect on Local Core vegetation, or
- b) reduces the extent of a Local Core vegetation, or
- c) fragments an occurrence of the Local Core vegetation, or
- d) adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to Local Core vegetation where the requirements under the TSC Act have not been met.

3.2.3 Core - Urban Remnants Management

These are generally small isolated remnants of Critically Endangered Ecological Communities in urban areas. The canopy remains but no understorey is present.

Objectives

- To protect and retain these 'Core – Urban Remnants' within an urban setting,
- No net loss of 'Core – Urban Remnants',
- To protect the contribution 'Core – Urban Remnants' have to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to 'Core – Urban Remnants' where that action:

- e) reduces the extent of Core – Urban Remnants, or
- f) adversely affects the capacity of a regional connectivity area and riparian corridor.

A person must not take an action in or adjacent to Core – Urban Remnants where the requirements under the TSC Act have not been met.

3.2.4 Support for Core Management

These are patches of vegetation that are in poorer condition but are adjacent to Core lands. They have values in buffering and, in the longer term, increasing the size of Core.

Objectives

- To maintain 'Support for Core' vegetation remnants as buffer and protection for Core vegetation,
- Some flexibility for trading and offsets,
- To restore 'Support for Core' remnants to good condition, and
- To protect the contribution 'Support for Core' lands have to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to 'Support for Core' lands where that action:

- g) reduces the extent of Support for Core vegetation except where it involves enhancing its condition, or
- h) fragments an occurrence of the Support for Core vegetation, or
- i) modifies or destroys abiotic factors (such as water, nutrients, or soil) necessary for the survival of Support for Core vegetation, or
- j) results in invasive species that are harmful to Support for Core vegetation becoming established in an occurrence of these lands, or
- k) diminishes the capacity of a buffer area adjacent to Regional Core vegetation, or
- l) adversely affects the capacity of a regional connectivity area and riparian corridor.

A person must not take an action in or adjacent to Support for Core vegetation where the requirements under the TSC Act have not been met.

3.2.5 *Riparian Corridors Management*

Vegetation along streams has many values, including protection of in-stream habitat, prevention of soil erosion and often provides highly valuable habitat areas.

Objectives

- To protect and manage existing good condition vegetation remnants in 'Riparian Corridors',
- To restore degraded vegetation in 'Riparian Corridors',
- To regenerate vegetation in cleared areas along 'Riparian Corridors'
- To protect and restore buffer areas to vegetation in the 'Riparian Corridors',
- To identify, protect and manage the aquatic ecological values, and
- To protect the linkages provided by 'Riparian Corridors'.

Performance Measures

A person must not take an action in or adjacent to lands mapped as Riparian Corridors where that action:

- a) leads to a long-term adverse affect on good condition native vegetation within the Riparian Corridors, or
- b) reduces the extent of vegetation within the Riparian Corridors, or
- c) fragments an occurrence of vegetation within the Riparian Corridors, or
- d) modifies or destroys abiotic factors (such as water, nutrients, or soil) necessary for the survival of vegetation within the Riparian Corridors, or
- e) results in invasive species that are harmful to Riparian Corridors becoming established in an occurrence of these lands, or
- f) diminishes the capacity of a buffer area adjacent to Riparian Corridors, or
- g) adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to Riparian Corridor vegetation where the requirements under the TSC Act, Fisheries Management Act and Rivers and Foreshore Improvement Act (or Water Management Act when it repeals the RFI Act) have not been met.

3.2.6 *Regional Connectivity Areas Management*

'Regional Connectivity Areas' are sets of vegetation remnants that are in close proximity to large Regional and Local Core lands. These areas are the best opportunities to consolidate existing vegetation into large blocks of habitat through restoration and replanting.

Objectives

- To protect and manage existing good condition vegetation remnants in 'Regional Connectivity Areas',
- To protect the linkages provided by 'Regional Connectivity Areas',
- To restore degraded vegetation, and
- To regenerate vegetation in cleared areas.

Performance Measures

A person must not take an action in or adjacent to lands mapped as Regional Connectivity Areas where that action:

- a) leads to a long-term adverse affect on good condition native vegetation within the Regional Connectivity Areas, or
- b) reduces the extent of vegetation within the Regional Connectivity Areas, or
- c) adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to vegetation within Regional Connectivity Areas where the requirements under the TSC Act have not been met.

- 4. New Policies for Liverpool**
- 5. Conservation Targets**
- 6. Habitat Offsetting**
- 7. Corridors and Connectivity**



Part D: Tools and Resources

Liverpool City Council Biodiversity Strategy

August 2003





Flora and Fauna of Liverpool

Liverpool City Council Biodiversity Strategy

August 2003



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Executive Summary

This report seeks to provide background information for the Liverpool City Council Biodiversity Strategy by presenting a summary of the flora and fauna of the Liverpool City Council Area. This includes Endangered Ecological Communities, threatened species of flora and fauna, as well as endangered populations.

This information contained in this report should be regularly reviewed and updated. It should be used in conjunction with the updated vegetation mapping provided in Part E of the Biodiversity Strategy.

Endangered Ecological Communities

There are a number of vegetation communities within Liverpool City Council that are listed under Schedule 1 of the NSW Threatened Species Conservation Act 1995 as Endangered Ecological Communities (EEC). A NPWS working paper has attributed a conservation status to these EEC's (pers. comm. R Giddens, NPWS), which include:

1. **Critically endangered:** Castlereagh Ironbark Forest, Castlereagh Swamp Woodland, , Western Sydney Dry Rainforest, Moist Shale Woodland
2. **Endangered:** Shale Sandstone Transition Forest (Low Sandstone Influence), Shale Plains Woodland, Alluvial Woodland, Shale Sandstone Transition Forest (High Sandstone Influence), Shale Hills Woodland, Shale Gravel Transition Forest and Riparian Forest

Threatened Species

Liverpool LGA is reported to support 13 threatened flora species. These are listed below:

<i>Acacia pubescens</i>	<i>Allocasuarina glareicola</i>
<i>Dillwynia tenuifolia</i>	<i>Grevillea parviflora</i>
<i>Grevillia juniperinas</i> Sub sps <i>juniperina</i>	<i>Gyrostemon thesioides</i>
<i>Leucopogon exolasius</i>	<i>Persoonia hirsute</i>
<i>Persoonia nutans</i>	<i>Pimelea spicata</i>
<i>Pterostylis saxicola</i>	<i>Pultenaea parviflora</i>
<i>Pultenaea pedunculata</i>	

Forty two (42) threatened fauna species have been recorded in the Liverpool LGA. threatened fauna species are listed below:

Cumberland land snail (<i>Meridolum carneovirens</i>)	Common bent-wing bat (<i>Miniopterus schreibersii</i>)	Large pied bat (<i>Chalinolobus dwyeri</i>)
Large-footed mouse-eared bat (<i>Myotis adversus</i>)	Greater broad-nosed bat (<i>Scoteanax rueppellii</i>)	Eastern false pipistrelle (<i>Falsistrellus tasmaniensis</i>)
Spotted-tailed quoll (<i>dasyurus maculatus</i>)	Yellow-bellied sheath-tail bat (<i>Saccolaimus flaviventris</i>)	Brush-tailed rock-wallaby (<i>Petrogale penicillata</i>)
East coast freetail bat (<i>Mormopterus norfolkensis</i>)	koala (<i>Phascolarctos cinereus</i>)	Giant burrowing frog (<i>Heleioporus australiacus</i>)
Barred frog (<i>Mixophyes balbus</i>)	Red-crowned toadlet (<i>Pseudophryne australis</i>)	Green and golden bell frog (<i>Litoria aurea</i>)
Australasian bittern (<i>Botaurus poiciloptilus</i>)	Barking owl (<i>Ninox connivens</i>)	Black bittern (<i>Ixobrychus flavicollis</i>)
Black necked stork (<i>Ephippiorhynchus asiaticus</i>)	Broad-billed sandpiper (<i>Limicola falcinellus</i>)	Brolga (<i>Grus rubicunda</i>)
Bush stone-curlew (<i>Burhinus gallarius</i>)	Comb crested jacana (<i>Irediparra gallinacea</i>)	Cotton pygmy-goose (<i>Nettapus coromandelianus</i>)
Glossy black-cockatoo (<i>Calyptorhynchus lathami</i>)	Grass owl (<i>Tyto capensis</i>)	Little tern (<i>Sterna albifrons</i>)
Pink cockatoo (<i>Cacatua leadbeateri</i>)	Magpie goose (<i>Anseranas semipalmata</i>)	Masked owl (<i>Tyto novaehollandiae</i>)
Mongolian plover (<i>Charadrius mongolus</i>)	Painted snipe (<i>Rostratula bengalensis</i>)	Regent honeyeater (<i>Xanthomyza phrygia</i>)
Superb fruit-dove (<i>Ptilinopus superbus</i>)	Sooty owl (<i>Tyto tenebricosa</i>)	Swift parrot (<i>Lathamus discolor</i>)
Wandering albatross (<i>Diomedea exulans</i>)	Wompoo fruit-dove (<i>Ptilinopus magnificus</i>)	Eastern pygmy-possum (<i>Cercartetus nanus</i>)
Black-chinned honeyeater (eastern subsp.) (<i>Melithreptus gularis gularis</i>)	Grey-headed flying-fox (<i>Pteropus poliocephalus</i>)	Speckled warbler (<i>Pyrrholaemus sagittatus</i>)

Endangered Populations

The TSC Act, 1995 currently lists 2 endangered populations of flora in the Liverpool LGA

- *Dillwynia tenuifolia* found at Kemps Creek, in the council area's northwest
- *Marsdenia viridiflora* R. Br. subsp. *viridiflora*, found in Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas

There are no endangered populations of fauna listed for the Liverpool LGA.

Other Conservation Values

Other conservation values present in the Liverpool City Council area include:

- Bushland corridors: These include the Maxwells Creek/Prestons corridor, the Cabramatta creek corridor and the Hinchinbrook Creek corridor, and include Cumberland Plain Woodland and Sydney Coastal River-Flat Forest, both EEC's listed under the TSC Act, 1995 (OCULUS, 1998). The Liverpool City Council Biodiversity Strategy has identified riparian corridors and regional connectivity areas (Part D).
- Regionally Significant species: Species of regional significance refer to the flora and fauna species that are not identified on national or state legislation and therefore not specifically protected. It is possible to derive a list of regionally significant species in the Liverpool LGA from Urban Bushland Biodiversity Survey (UBBS) data collated on an LGA basis.
- Internationally significant species: There are a number of migratory birds listed on the internationally agreements JAMBA/CAMBA that have been recorded in Liverpool LGA.
- Potential locally significant species: Locally significant species can be defined as those that have a major bearing on the immediate local vicinity.
- Habitat: There is a diversity of habitat across the landscape of the Liverpool Council area, with a number of ecological communities and a range of topography, which offers considerable ecological value to the area.

Threats to Conservation Values

Threats to conservation values are listed in this report. They include the key threatening processes as listed in Schedule 3 of the TSC Act, 1995, a range of threats to the EEC's in the Liverpool LGA and a listing of noxious weeds in the area.

Key threatening processes listed under the TSC Act, 1995 include:

- Bushrock removal (as described in the final determination of the Scientific Committee to list the threatening process)
- High frequency fire resulting in the disruption of life cycle processes in plants and animal and loss of vegetation structure and composition
- Invasion of plant communities by *Chrysanthemoides monilifera*

- Predation by *Gambusia holbrooki* (Plague Minnow or Mosquito Fish, as described in the final determination of the Scientific Committee to list the threatening process)
- Predation by the European Red Fox *Vulpes vulpes*
- Predation by the Feral Cat *Felis catus*

Threats to the EEC's in the Liverpool LGA include:

- The intensification of urban development
- Edge effects
- Weed invasion
- Planting of exotics.
- Stormwater
- Inappropriate reserve planning
- Inappropriate grounds management
- Changed fire regimes
- Altered soil conditions
- Broad scale developments

Noxious weeds are classified into four control categories requiring varying levels of control/eradication under the *Noxious Weeds Act, 1993*. The Liverpool LGA currently contains 32 declared noxious weeds. These are presented below:

- *Alternanthera philoxeroides*
- *Chrysanthemoides monilifera*
- *Centaurea nigra*
- *Rubus fruticosus* (agg. spp.)
- *Orobanche* spp.
- *Cabomba* spp.
- *Ricinus communis*
- *Cestrum parqui*
- *Harrisia* spp.
- *Hieracium* spp.
- *Equisetum* spp.
- *Acacia karroo*
- *Kochia scoparia*
- *Lagarosiphon major*
- *Lantana camara*
- *Lantana camara*
- *Ludwigia peruviana*
- *Nassella tenuissima* syn *Stipa tenuissima*
- *Miconia* spp.
- *Cortaderia* spp.
- *Parthenium hysterophorus*
- *Parietaria judaica*
- *Opuntia* spp.
- *Toxicodendron succedaneum*
- *Salvinia molesta*
- *Gymnocoronis spilanthoides*
- *Chromolaena odorata*
- *Centaurea maculosa*
- *Hypericum perforatum*
- *Eichhornia crassipes*
- *Pistia stratiotes*
- *Salix* spp.

Recovery Planning

This report also details recovery planning for EEC's as provided for in the NSW *Threatened Species Conservation Act, 1995* (TSC Act). The EEC's examined below are the subject of a Cumberland Plain Recovery Plan working paper currently being drafted by the NPWS (NPWS, unpublished(a)). The Recovery Plan working paper outlines a number of key issues that may influence the implementation of the plan, and which the plan itself impacts upon (NPWS, unpublished(a)). These are:

- Threatening processes
- Social and economic issues
- Other issues including the broader environmental problem of salinity

The recovery plan working paper also outlines a number of objectives and actions for Local Government. Objectives include:

- To increase the CAR (Comprehensive, Adequate, Representative) of the area of EEC protected through an open space network
- To provide and implement an integrated decision making framework for land use planning
- To achieve high quality and ecological integrity of EEC remnants through the adoption of best management standards in their management
- To develop public knowledge and awareness regarding EEC and foster relevant active community participation in it's conservation

1. Introduction

This report seeks to provide background information for the Liverpool City Council Biodiversity Strategy by presenting a summary of the flora and fauna of the Liverpool City Council Area.

This summary includes the following:

- Endangered Ecological Communities under the *NSW Threatened Species Conservation Act 1995* (TSC Act, 1995)
- Threatened Species of Flora and Fauna listed under the TSC Act, 1995
- Endangered Populations listed under the TSC Act, 1995
- Other values

This information contained in this report should be regularly reviewed and updated. It should be used in conjunction with the updated vegetation mapping provided in Part E of the Biodiversity Strategy.

2. Endangered Ecological Communities

The *NSW Threatened Species Conservation Act, 1995* provides for the listing of Endangered Ecological Communities (EEC's) and the preparation of Recovery Plans. Council is obliged to consider/carry out actions under Recovery Plans which apply to EEC's occurring in the area. The *Local Government Act, 1993* provisions state that a separate Plan of Management is required for lands that support an EEC that is the subject of a Recovery Plan.

There are a number of vegetation communities within Liverpool City Council that are listed under Schedule 1 of the *NSW Threatened Species Conservation Act, 1995* as Endangered Ecological Communities. Distribution of each EEC was calculated based on NPWS reported figures (NPWS, 2000a). Figures shown below refer to sites classed as A, B or C by the NPWS. Sites that have been assigned these classes are said to be in 'good condition', with class A being the most intact and class C being the least intact.

2.1 Shale Sandstone Transition Forest (SSTF)

Based on the degree of sandstone influence, this EEC has been divided by the NPWS into two different forms, Shale Sandstone Transition Forest (Low Sandstone Influence) and Shale Sandstone Transition Forest (High Sandstone Influence) (NPW, 2000a). This EEC has also been described in the Urban Bushland Biodiversity Survey (UBBS) report (NPWS, 1997a) as Western Shale/Sandstone Transition Forest.

2.1.1 Shale Sandstone Transition Forest (Low Sandstone Influence)

This community is dominated by *Eucalyptus tereticornis*. It occurs mainly on Wianamatta Shale soils, and is found around the margins of the Cumberland Plain (NPWS, 2000b). For a detailed description of this community see the Western Sydney Vegetation Mapping Project (NPWS, 2000a).

Distribution

Total remnant area of 'good condition' SSTF (LSI) in Liverpool:	82.88 ha
As a percentage of what remains across the whole Cumberland Plain:	3.91%
Predicted pre-1750 distribution in Liverpool:	229.5 ha
Percentage of 'good condition' SSTF (LSI) now remaining in Liverpool:	36.11%

2.1.2 *Sandstone Transition Forest (High Sandstone Influence).*

Grey gum (*Eucalyptus punctata*) and narrow leaved ironbark (*Eucalyptus crebra*) dominate this EEC. It is found on the shale/sandstone boundary towards the southeast and southwest of the Cumberland Plain, and is also found in the north and northwest margins. Sandstone Transition Forest (High Sandstone Influence) occurs on residual clay soils derived from Wianamatta Shale (NPWS, 2000b). For a detailed description of this community see the *Western Sydney Vegetation Mapping Project* (NPWS, 2000a).

Distribution

Total remnant area of 'good condition' SSTF (HSI) in Liverpool:	9.13 ha
As a percentage of what remains across the whole Cumberland Plain:	0.15%
Predicted pre-1750 distribution in Liverpool:	366.10 ha
Percentage of 'good condition' SSTF (HSI) now remaining in Liverpool:	2.49%

Reservation and Zoning

Small areas of this community can be found in the Blue Mountains National Park, Cattai National Park and Gulguer Nature Reserve (NPWS, 2000b). Across the Cumberland Plain, SSTF (High Sandstone Influence) has approximately 1% of the remaining area reserved in NPWS estate, with approximately 13% in areas zoned for environmental protection and 5% in areas zoned as open space (NPWS, 2000a).

Across the Cumberland Plain, SSTF (Low Sandstone Influence) has less than 1% of the remaining area listed as NPWS estate with approximately 5% in areas zoned for environmental protection, and approximately 4% in areas zoned as open space (NPWS, 2000a).

Management Recommendations

NSW Scientific Committee is of the opinion that unless the factors threatening survival or evolutionary development cease, this community is likely to become extinct in nature (NPWS, 2000b).

Recommendations include the identification and mapping of the various remnants of these EECs, identification of the relative condition and development of appropriate specific strategies. These could include the fencing of areas to avoid informal access, preventing mowing in selected areas, provision of revegetation/regeneration in selected areas, potential acquisition of suitable sites, placing appropriate planning controls in identified areas and developing cooperative arrangements with various land managers (government and private).

2.2 Castlereagh Ironbark Forest (CIF)

Broad Leaved Ironbark (*Eucalyptus fibrosa*) and white feather honeymyrtle (*Melaleuca decora*) dominate this community. CIF primarily occurs on clay soils derived from tertiary alluvium, or on shale soils adjacent to the boundary with Tertiary Alluvium. For a full description of CIF, see NPWS (2000a).

Distribution

Total remnant area of 'good condition' CIF in Liverpool:	177.26 ha
As a percentage of what remains across the whole Cumberland Plain:	20.64%
Predicted pre-1750 distribution in Liverpool:	1321.27ha
Percentage of 'good condition' CIF now remaining in Liverpool:	13.41%

Reservation and Zoning

Across the Cumberland Plain, CIF has approximately 25.28% of the remaining area reserved in NPWS estate, with approximately 5.67% in areas zoned for Environmental protection and 6.62% in areas zoned as open space (NPWS, 2000a).

Management Recommendations

The NSW Scientific Committee is of the opinion that Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion is likely to become extinct in nature in New South Wales due to the originally restricted distribution of this community, its inadequate representation within conservation reserves, the extensive disturbance and fragmentation and weed invasion that has occurred and the ongoing development and use threats (NSW Scientific Committee, 2001)

Recommendations include the identification and mapping of the various remnants of these EECs, identification of the relative condition and development of appropriate specific strategies These could include potential acquisition of suitable sites, placing appropriate planning controls in identified areas, the fencing of areas to avoid informal access, preventing mowing in selected areas, provision of revegetation/regeneration in selected areas, and developing cooperative arrangements with various land managers (government and private).

2.3 Castlereagh Swamp Woodland (CSW)

CSW is also described in previous studies as Swamp Woodland (14c) by Benson (1992) and Benson and Howell (1994) and as Castlereagh Swamp Woodland in the UBBS report (NPWS, 1997a). This EEC is dominated by *M. decora*. It occurs in poorly drained depressions on soils derived from Tertiary Alluvium, or on shale soils where the influence of Tertiary Alluvium is strong (NPWS, 2000b). For a detailed description of this community see the Western Sydney Vegetation Mapping Project (NPWS, 2000a).

Distribution

Total remnant area of 'good condition' CSW in Liverpool:	33.97 ha
As a percentage of what remains across the whole Cumberland Plain:	15.37%
Predicted pre-1750 distribution in Liverpool (not modeled):	0.00ha
Percentage of 'good condition' CSW now remaining in Liverpool:	n/a

Reservation and Zoning

The NSW Scientific Committee found that for CSW all occurrences are smaller than 100 Ha in size, and only have small areas reserved in places such as Castlereagh Nature Reserve. Across the Cumberland Plain, CSW has approximately 5% of the remaining area listed as NPWS reserves with 6 % in areas zoned for environmental protection and approximately 52% in areas zoned as open space (NPWS, 2000a).

Management Recommendations

The NSW Scientific Committee is of the opinion that unless the factors threatening survival or evolutionary development cease, especially with respect to clearing, this EEC is likely to become extinct in nature (NPWS, 2000b).

Recommendations include the identification and mapping of the various remnants of these EECs, identification of the relative condition and development of appropriate specific strategies. These could include potential acquisition of suitable sites, placing appropriate planning controls in identified areas, the fencing of areas to avoid informal access, preventing mowing in selected areas, provision of revegetation/regeneration in selected areas, and developing cooperative arrangements with various land managers (government and private).

2.4 Cumberland Plain Woodland (CPW)

The NPWS (2000a) currently lists two forms of this community, Shale Hills Woodland and Shale Plains Woodland. This EEC has also been previously described as Spotted Gum Forest (9b), Grey Box Woodland (10c), Grey Box-Ironbark Woodland (10d) by Benson (1992) and Benson and Howell (1994) and also as Spotted Gum Forest, Grey Box Woodland, Grey Box-Ironbark Woodland in the UBBS project (NPWS, 1997a).

2.4.1 Shale Hills Woodland (SHW)

Forest Red Gum (*E. tereticornis*) and Grey Box (*Eucalyptus molucanna*) dominate the Shale Hills Woodland EEC. This community is confined to the southern half of the Cumberland Plain, and most often occurs in undulating country. Primarily occurring on soil derived from Wianamatta Shale, it reaches its northern limit at Mulgoa Nature Reserve and Prospect Reservoir (NPWS, 2000b). For a detailed description of this community see the Western Sydney Vegetation Mapping Project (NPWS, 2000a).

Distribution

Total remnant area of 'good condition' SHW in Liverpool:	669.48 ha
As a percentage of what remains across the whole Cumberland Plain:	15.34%
Predicted pre-1750 distribution in Liverpool:	4151.43ha
Percentage of 'good condition' SHW now remaining in Liverpool:	16.12%

2.4.2 Shale Plains Woodland (SPW)

The Shale Plains EEC is dominated by *E. tereticornis* and *E. molucanna*. It is the most widely distributed community in the Cumberland Plain, found south of Prospect Reservoir, and also towards the western boundary of the plain, south of the Mulgoa Nature Reserve. This EEC occurs on well drained Holocene Alluvium as well as soils

derived from Wianamatta Shale (NPWS, 2000b). For a detailed description of this community see the Western Sydney Vegetation Mapping Project (NPWS, 2000a).

Distribution

Total remnant area of 'good condition' SPW in Liverpool:	1072.51ha
As a percentage of what remains across the whole Cumberland Plain:	16.57%
Predicted pre-1750 distribution in Liverpool:	15244.02ha
Percentage of 'good condition' SPW now remaining in Liverpool:	7.03%

Reservation and Zoning

The NSW Scientific Committee found only 6% of the original extent of Cumberland Plain Woodland remained in 1988. This was not considered to be sufficient to ensure long-term conservation of this community (NPWS, 2000b).

Across the Cumberland Plain, Shale Hills Woodland has approximately 3% of the remaining area reserved in NPWS estate, with approximately 12% zoned for environmental protection, and 8% zoned as open space (NPWS, 2000a). Across the Cumberland Plain, Shale Plains Woodland has less than 2% of the remaining area listed as NPWS estate with approximately 3% zoned for Environmental protection, and 12% zoned as open space (NPWS, 2000a).

Management Recommendations

The NSW Scientific Committee has found that due to the reduced area of this community, factors threatening its survival must cease to operate or the CPW is likely to become extinct.

Recommendations include the identification and mapping of the various remnants of CPW, identification of the relative condition and development of appropriate specific strategies. These could include the fencing of areas to avoid informal access, preventing mowing in selected areas, provision of revegetation/regeneration in selected areas, potential acquisition of suitable sites, placing appropriate planning controls in identified areas and developing cooperative arrangements with various land managers (government and private).

2.5 Sydney Coastal River-Flat Forest (SCRF)

The EEC SCRF has been divided into two forms by NPWS. These are Alluvial Woodland and Riparian Forest (NPWS, 2000b). SCRF has also been described as River Flat Forest (9f) and Camden White Gum Forest (6d) by Benson (1992) and Benson and Howell (1994) and as River Flat Forest (Cumberland Plain Creek Systems) and River Flat Forest (Hawkesbury-Nepean River and major tributaries) in the UBBS reports (NPWS, 1997a).

2.5.1 Alluvial Woodland (AW)

The NPWS (2000b) notes that Cabbage Gum (*Eucalyptus amplifolia*) and *E. tereticornis* are two of the more common species in this community. Alluvial Woodland occurs at or near minor watercourses, which drain soils derived from

Wianamatta Shale. For a detailed description of this community see the Western Sydney Vegetation Mapping Project (NPWS, 2000a).

Distribution

Total remnant area of 'good condition' AW in Liverpool:	656.4 ha
As a percentage of what remains across the whole Cumberland Plain:	20.9%
Predicted pre-1750 distribution in Liverpool:	3199.91ha
Percentage of 'good condition' AW now remaining in Liverpool:	20.51%

2.5.2 Riparian Forest (RF)

Bangalay (*Eucalyptus botryoides*), River Peppermint (*Eucalyptus elata*), Broad leaved Apple (*Angophora subvelutina*) and Rough barked Apple (*A. floribunda*) are species that may be dominant in this community (NPWS, 2000b). Riparian Forest is mainly found on soils derived from Holocene Alluvium. For a detailed description of this community see the Western Sydney Vegetation Mapping Project (NPWS, 2000a).

Distribution

Total remnant area of 'good condition' RF in Liverpool:	106.85 ha
As a percentage of what remains across the whole Cumberland Plain:	10.31%
Predicted pre-1750 distribution in Liverpool:	458.16 ha
Percentage of 'good condition' RF now remaining in Liverpool:	23.32%

Reservation and Zoning

Most of this community has been cleared for residential development and agricultural activities. NPWS reserves include Cattai National Park, Dharug National Park, Georges River National Park, Scheyville National Park, Gulguer Nature Reserve, Mulgoa Nature Reserve and Marramarra National Park.

Across the Cumberland Plain, Alluvial Woodland has less than 1% of the remaining area reserved in NPWS reserves, with approximately 5% in areas zoned for environmental protection, and approximately 12% in areas zoned as open space (NPWS, 2000a). Riparian Forest has 3.45% of the remaining area listed in NPWS reserves with 17.69% in areas zoned for Environmental protection, 7.17% in areas zoned as open space and 9.41% in areas zoned as Special Uses (NPWS, 2000a).

Management recommendations

The NSW Scientific Committee is of the opinion that unless the factors threatening survival or evolutionary development cease, this EEC is likely to become extinct in nature (NPWS, 2000b).

2.6 Shale/Gravel Transition Forest (SGTF)

E. fibrosa is the dominant species in this community, with *E. Moluccanna* and *E. tetricornis* being present, but less frequent. Shale/Gravel Transition Forest occurs primarily where shallow deposits of tertiary alluvium overlie shale soils. For a full description of SGTF, see the Vegetation Mapping for Western Sydney (NPWS, 2000a).

Distribution

Total remnant area of 'good condition' SGTF in LCC:	682.6 ha
As a percentage of what remains across the whole Cumberland Plain:	26%*
Predicted pre-1750 distribution in LCC:	413.9ha*
Percentage of 'good condition' SGTF now remaining in LCC:	164%*

*Information based on NPWS modeling yet to be updated from NPWS ground truthing.

Reservation and Zoning

Across the Cumberland Plain, Shale Gravel Transition Forest has less than 9% of the remaining area reserved in NPWS reserves, with approximately 11% in areas zoned for Environmental protection, and approximately 12% in areas zoned as open space (NPWS, 2000a).

Management recommendations

The NSW Scientific Committee is of the opinion that unless the factors threatening survival or evolutionary development cease, this EEC is likely to become extinct in nature (NSW Scientific Committee, 2002a).

2.7 Moist Shale Woodland (MSW)

E. tereticornis and *E. Moluccana* are the dominant species in this community, with *E. crebra* and *Corymbia moluccana* occurring more occasionally. Moist Shale Woodland occurs exclusively on soils derived from Wianamatta Shale, and is restricted to rugged areas at higher elevations. For a full description of MSW, see the Vegetation Mapping for Western Sydney (NPWS, 2000a).

Distribution

MSW present in LCC in Tx and Txr condition: 7.35ha. There is no ABC condition vegetation remaining in Liverpool LGA.

Reservation and Zoning

Across the Cumberland Plain, Moist Shale Woodland has less than 7.5% of the remaining area reserved in NPWS reserves, with approximately 21% in areas zoned for Environmental protection, and approximately 2.6% in areas zoned as open space (NPWS, 2000a).

Management recommendations

The NSW Scientific Committee is of the opinion that unless the factors threatening survival or evolutionary development cease, this EEC is likely to become extinct in nature (NPWS, 2002).

2.8 Mangrove/Saltmarsh Complex (MSC)

The Georges River Biodiversity Study (NPWS, unpublished (b).) states that further sampling is required to adequately characterise the floristic composition of this community. Parent geology is 100% estuarine. This community is categorized as endangered by the study.

2.9 Western Sydney Dry Rainforest

Contains no remnants but modeled to occur in Liverpool LGA pre 1750.

2.10 Conservation Status of Communities

None of the EECs listed above meet agreed conservation targets for forest ecosystems to achieve a Comprehensive Adequate Representative reserve system (15% of pre-1750 extent – JANIS and NFPS, Commonwealth Government, 1992) or more recent national targets (30% of pre-1750 extent, Commonwealth Government, 2001).

The figures provided in section 2 will need to be regularly re-calculated to remain up-to-date. A NPWS working paper has attributed the following conservation status to these EEC's (pers. comm. R Giddens, NPWS):

1. **Critically endangered:** Castlereagh Ironbark Forest, Castlereagh Swamp Woodland, , Western Sydney Dry Rainforest, Moist Shale Woodland
2. **Endangered:** Shale Sandstone Transition Forest (Low Sandstone Influence), Shale Plains Woodland, Alluvial Woodland, Shale Sandstone Transition Forest (High Sandstone Influence), Shale Hills Woodland, Shale Gravel Transition Forest and Riparian Forest.

2.11 Recovery Planning Context

The NSW *Threatened Species Conservation Act, 1995* (TSC Act) provides for the listing of Endangered Ecological Communities (EEC's) and preparation of Recovery Plans. The EEC's examined above are the subject of a Cumberland Plain Recovery Plan working paper currently being drafted by the NPWS (NPWS, unpublished(a)).

The overall aim of the Cumberland Plain EEC Recovery Plan will be to:

"Reverse degrading processes and trends of loss of fragmentation of the Cumberland Plain Endangered Ecological Communities so as to achieve no net loss, and eventual increase, in the extent, quality and ecological integrity of the communities" (NPWS, working draft).

The Recovery Plan working paper outlines a number of key issues that may influence the implementation of the plan, and which the plan itself impacts upon (NPWS, unpublished (a)). These are:

- Threatening processes, including clearing for development, fragmentation, grazing and mowing, water pollution, sedimentation, increased nutrient loads, weed invasion, inappropriate fire regimes, and illegal use such as trail bike riding and rubbish dumping.
- Social and economic issues, including provision of recreational opportunities, enhancement in living standards, impacts of bushland on land values, constraints to development and economic impacts.

- Other issues include the broader environmental problem of salinity and the role that the recovery plan can play in positively contributing to resolving this widespread problem.

The recovery plan working paper also outlines a number of actions for local government. These are divided broadly under a set of corresponding objectives, a summary of which is provided in the table below.

Table 1: Objectives and actions for Local Government

Objectives	Actions
To increase the CAR of the area of EEC protected through an open space network	Acquisition for open space, based upon conservation significance outlined in the recovery plan, and targeting public lands
To provide and implement an integrated decision making framework for land use planning	Local environment planning and land rezoning under the EP & A Act 1979 and Development Consents based upon conservation significance outlined in the recovery plan and on the biodiversity planning guide for NSW Local Government
To achieve high quality and ecological integrity of CPEEC remnants through the adoption of best management standards in their management	POMs and best practice standards Best practice standards for noxious weed control
To develop public knowledge and awareness regarding CPEEC and foster relevant active community participation in it's conservation	Councils to promote community involvement

Once a recovery plan has been approved, both government and non-government bodies will be required to carry out its actions and recommendations. The *Local Government Act, 1993* provisions have stated that a separate plan of management is required for lands that support an EEC that is the subject of a recovery plan. It is important to note that the Liverpool Council has been listed as a public authority responsible for the implementation of the recovery plan. The implications of this are that LCC needs to report on measures taken to implement recovery actions and any decision making process needs to carefully consider provisions of the recovery plan so as to ensure consistency.

In an attempt to prioritise the recovery of habitat in the Cumberland Plain, NPWS have provided a possible approach to identify important habitat. Classifications of "Core", "Restore to Core" and "Other Vegetation" are based on condition of vegetation as well as size of remnants. Core and Restore to Core areas are prioritised from highest to lowest according to their size and condition.

On a broader national scale, Commonwealth Government (2001) has released the *National Objectives and Targets for Biodiversity Conservation 2001–2005*. This paper provides targets for the protection and restoration of native vegetation and terrestrial ecosystems, through the reversal of long term decline in native vegetation communities and their ecosystems and by protection of a representative sample of these ecosystems. It proposes that by 2003, all jurisdictions have clearing controls in place that prevent clearance of ecological communities with an extent below 30

per cent of that present pre-1750; and that all jurisdictions have programs in place to assess vegetation condition (Environment Australia, 2001). These targets are highly relevant to the forthcoming NPWS Cumberland Plain Recovery Plan and future Biodiversity management plans for the Liverpool LGA.

3. Threatened Species

Following is a list of threatened flora and fauna that have been recorded in the Liverpool City Council area. These records have been obtained from searches of the NPWS Urban Bushland Biodiversity Survey listings (NPWS, 1997a,b) and the NPWS Wildlife Atlas (NPWS, 2001a). Where available, the TSC Act 1995 and EPBC Act 1999 status has been listed.

Key to Status

E1: Endangered Species under Part 1, Schedule 1 of the TSC Act, 1995.

V: Vulnerable species under Schedule 2 of the TSC Act, 1995.

Vulnerable: Vulnerable species under EPBC Act, 1999.

Endangered: Endangered Species under EPBC Act, 1999.

3.1 Threatened Species – Flora

Table 2 below lists 13 threatened flora species recorded in Liverpool. Recovery Plan information has been taken from NPWS (2000c). Recovery Plans will be prepared for all threatened species.

Table 2: Flora

Species	TSC Act Status	EPBC Act Status	Recovery Plan	Source
<i>Acacia pubescens</i>	V	Vulnerable	Draft Recovery Plans exhibited under the TSC Act, 1995	Wildlife Atlas, NPWS
<i>Allocasuarina glareicola</i>	E1	Endangered	Draft Recovery Plans exhibited under the TSC Act, 1995	NPWS
<i>Dillwynia tenuifolia</i>	V	Vulnerable	None	Wildlife Atlas, NPWS
<i>Grevillea parviflora</i>	V	Vulnerable	None	Wildlife Atlas NPWS
<i>Grevillia juniperina</i> Sub sps <i>juniperina</i>	V	—	None	NPWS
<i>Gyrostemon thesioides</i>	E1	—	None	NPWS
<i>Leucopogon exolasius</i>	V	Vulnerable	None	NPWS
<i>Persoonia hirsute</i>	E1	—	None	NPWS
<i>Persoonia nutans</i>	E1	Endangered	Recovery Plan in prep.	Wildlife Atlas, NPWS
<i>Pimelea spicata</i>	E1	Endangered	Draft Recovery Plans exhibited under the TSC Act, 1995	Wildlife Atlas, NPWS

<i>Pterostylis saxicola</i>	E1	Endangered	None	Wildlife Atlas, NPWS
<i>Pultenaea parviflora</i>	E1	Vulnerable	None	Wildlife Atlas, NPWS
<i>Pultenaea pedunculata</i>	E1	—	None	Wildlife Atlas, NPWS

3.2 Threatened Species – Fauna

The tables below lists threatened fauna species recorded in Liverpool. Recovery Plan information has been taken from NPWS (2000c).

Table 3: Molluscs

Common name	Scientific Name	TSC Act Status	EPBC Act Status	Recovery Plan	Source
Cumberland land snail	<i>Meridolum corneovirens</i>	E1	—	Recovery Plan in prep.	Wildlife Atlas, NPWS

Table 4: Mammals

Common name	Scientific Name	TSC Act Status	EPBC Act Status	Recovery Plan	Source
Common bent-wing bat	<i>Miniopterus schreibersii</i>	V	—	None	UBBS, NPWS
Large pied bat	<i>Chalinolobus dwyeri</i>	V	Vulnerable	None	UBBS
Large-footed mouse-eared bat	<i>Myotis adversus</i>	V	—	None	UBBS
Greater broad-nosed bat	<i>Scoteanax rueppellii</i>	V	—	None	UBBS
Eastern false pipistrelle	<i>Falsistrellus tasmaniensis</i>	V	—	None	Wildlife Atlas, NPWS
Spotted-tailed quoll	<i>Dasyurus maculatus</i>	V	Endangered	None	Wildlife Atlas, NPWS
Yellow-bellied sheath-tail bat	<i>Saccolaimus flaviventris</i>	V	—	None	Wildlife Atlas, NPWS
Brush-tailed rock-wallaby	<i>Petrogale penicillata</i>	V	Vulnerable	None	Wildlife Atlas, NPWS
East coast freetail bat	<i>Mormopterus norfolkensis</i>	V	—	None	Wildlife Atlas, NPWS
Koala	<i>Phascolarctos cinereus</i>	V	—	None	Wildlife Atlas, NPWS

Eastern pigmy-possum	<i>Cercartetus nanus</i>	V	—	None	Wildlife Atlas, NPWS
Grey-headed flying-fox	<i>Pteropus poliocephalus</i>	V	—	None	Wildlife Atlas, NPWS

Table 5: Amphibians

Common name	Scientific Name	TSC Act Status	EPBC Act Status	Recovery Plan	Source
Giant burrowing frog	<i>Heleioporus australiacus</i>	V	Vulnerable	None.	UBBS
Barred frog	<i>Mixophyes balbus</i>	V	Vulnerable	None	UBBS
Red-crowned toadlet	<i>Pseudophryne australis</i>	V	—	None	UBBS
Green and golden bell frog	<i>Litoria aurea</i>	E	Vulnerable	Recovery Plan in prep.	UBBS

Table 6: Birds

Common name	Scientific Name	TSC Act Status	EPBC Act Status	Recovery Plan	Source
Australasian bittern	<i>Botaurus poiciloptilus</i>	V	—	None	NPWS
Barking owl	<i>Ninox connivens</i>	V	—	Recovery plan in prep	Wildlife Atlas, NPWS
Black chinned honeyeater (eastern subsp.)	<i>Melithreptus gularis gularis</i>	V	—	None	Wildlife Atlas, NPWS
Black bittern	<i>Ixobrychus flavicollis</i>	V	—	None	UBBS
Black necked stork	<i>Ephippiorhynchus asiaticus</i>	E1	—	None	NPWS
Broad-billed sandpiper	<i>Limicola falcinellus</i>	V	—	None	UBBS
Brolga	<i>Grus rubicunda</i>	V	—	None	UBBS
Bush stone-curlew	<i>Burhinus grallarius</i>	E1	—	None	UBBS
Comb crested jacana	<i>Irediparra gallinacea</i>	V	—	None	NPWS
Cotton pygmy-goose	<i>Nettapus coromandelianus</i>	E1	—	None	UBBS
Glossy black-	<i>Calyptorhynchus</i>	V	—	None.	UBBS

cockatoo	<i>lathami</i>				
Grass owl	<i>Tyto capensis</i>	V	—	None	UBBS
Little tern	<i>Sterna albifrons</i>	E1	—	Draft Recovery Plans exhibited under the TSC Act, 1995	UBBS
Major mitchell cockatoo	<i>Cacatua leadbeateri</i>	V	—	None	NPWS
Magpie goose	<i>Anseranas semipalmata</i>	V	—	None	UBBS
Masked owl	<i>Tyto novaehollandiae</i>	V	—	None	NPWS
Mongolian plover	<i>Charadrius mongolus</i>	V	—	None	UBBS
Painted snipe	<i>Rostratula bengalensis</i>	V	—	None	NPWS
Regent honeyeater	<i>Xanthomyza phrygia</i>	E1	Endangered	None.	UBBS
Superb fruit-dove	<i>Ptilinopus superbus</i>	V	—	None	UBBS
Sooty owl	<i>Tyto tenebricosa</i>	V	—	None	NPWS
Speckled warbler	<i>Pyrrholaemus sagittatus</i>	V	—	None	Wildlife Atlas, NPWS
Swift parrot	<i>Lathamus discolor</i>	V	Endangered	None	UBBS
Wandering albatross	<i>Diomedea exulans</i>	E1	—	None	NPWS
Wompoo fruit-dove	<i>Ptilinopus magnificus</i>	V	—	None	UBBS

4. Endangered Populations

Endangered Populations are listed under Schedule 1 of the TSC Act 1995. A population is eligible to be listed as an endangered population if, in the opinion of the NSW Scientific Committee, its numbers have been reduced to such a critical level, or its habitat has been so drastically reduced, that it is in immediate danger of extinction and it is not a population of a species already listed in Schedule 1, and it is disjunct and at or near the limit of its geographic range, or it is or is likely to be genetically distinct, or it is otherwise of significant conservation value (TSC Act, 1995).

The TSC Act, 1995 currently lists 2 endangered flora population in the Liverpool LGA.

- *Dillwynia tenuifolia* found at Kemps Creek, in the council area's northwest.
- *Marsdenia viridiflora* R. Br. subsp. *viridiflora*, found in Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas.

Wahlenbergia multicaulis (Tadgell's Bluebell) is listed as an endangered flora population and occurs in the local government areas of Auburn, Bankstown, Strathfield and Canterbury (NSW Scientific Committee, 2002). This species has been recorded in Liverpool, and a targeted survey has been recommended in order to establish the extent of its occurrence.

There are no endangered fauna populations listed for the Liverpool LGA.

5. Other Conservation Values

Other conservation values present in the Liverpool City Council area include:

5.1 Bushland Corridors

Corridors are made up of vegetation along road and rail reserves and verges, steep un-cleared ridges, river and creek edges, lake foreshore reserves, and easements for utilities. Plant and animal species are able to gain access to areas of suitable habitat by using these corridors, and this encourages diversity and sustainability within ecosystems.

In 1998, Liverpool City Council conducted a study of bushland corridors in new release areas (OCULUS, 1998). This study aimed to identify and map bushland linkages and corridors and to investigate options for managing bushland remnants in new release areas. The study found that there is a potential to create three major biodiversity corridors, linking areas of core habitat across the Liverpool area. These are the Maxwells Creek/Prestons corridor, the Cabramatta creek corridor and the Hinchinbrook creek corridor, and include Cumberland Plain Woodland and Sydney Coastal River-Flat Forest, both EEC's listed under the TSC Act, 1995 (OCULUS, 1998).

The study also found that there were threats to this core habitat from clearing, construction of flood detention basins, residential and industrial development, and the construction of the Western Sydney Orbital Road (OCULUS, 1998).

More recent work by Eco Logical Australia Pty Ltd mapped the corridor areas along riparian areas and linking core remnants of vegetation that met certain size criteria. This mapping has been provided as part of the Liverpool Biodiversity Strategy (Part E).

5.2 Regionally Significant Species

Species of regional significance refer to the flora and fauna species that are not identified on national or state legislation and therefore not specifically protected. They may be considered vulnerable in the region and not commonly found locally. They may refer to species that do not have a large area of habitat reserved or protected in the locality and may be indicators of a particular habitat type that is diminishing. They may also be species at the edge of their known range and therefore may be of importance for maintenance of genetic diversity. A full list of regionally significant species in the Liverpool LGA is available from UBBS data collated on an LGA basis (NPWS, 1997a,b).

5.3 Internationally Significant Species – JAMBA & CAMBA

The agreement between the Government of Australia and the Government of Japan for the protection of migratory birds and birds in danger of extinction and their environment is more commonly called the Japan-Australia Migratory Bird Agreement (JAMBA) and was signed on 6 February 1974.

The agreement between the Government of Australia and the Government of the People's Republic of China for the protection of migratory birds and their environment, is more commonly called the China-Australia Migratory Bird Agreement (CAMBA) and was signed on 20 October 1986 (EABG, 2000).

Under JAMBA and CAMBA, the Governments of Australia, Japan and the People's Republic of China have agreed to protect migratory birds and their important habitats. There are a number of migratory birds on these lists that have been recorded in Liverpool (NPWS, 1997b).

Table 7: Internationally Significant Species

Common Name	Species Name	JAMBA/CAMBA Listing
Broad-billed sandpiper	<i>Limicola falcinellus</i>	JAMBA, CAMBA
Cattle egret	<i>Ardea ibis</i>	JAMBA, CAMBA
Common sandpiper	<i>Actitis hypoleucos</i>	JAMBA, CAMBA
Common tern	<i>Sterna hirundo</i>	JAMBA, CAMBA
Crested tern	<i>Sterna bergii</i>	JAMBA
Eastern curlew	<i>Numenius madagascariensis</i>	JAMBA, CAMBA
Great egret	<i>Ardea alba</i>	JAMBA, CAMBA
Little tern	<i>Sterna albifrons</i>	JAMBA
Mongolian plover	<i>Charadrius mongolus</i>	JAMBA, CAMBA
Oriental plover	<i>Charadrius veredus</i>	JAMBA, CAMBA
Ruddy turnstone	<i>Arenaria interpres</i>	JAMBA, CAMBA
Whimbrel	<i>Numenius phaeopus</i>	JAMBA, CAMBA
White-bellied sea-eagle	<i>Haliaeetus leucogaster</i>	CAMBA
White-throated needletail	<i>Hirundapus caudacutus</i>	JAMBA, CAMBA

5.4 Potential for locally significant species

Within the LCC LGA there may be a number of locally significant species. Locally significant species can be defined as those that have a major bearing on the immediate local vicinity. Inter-relationships between species within the local area mean that certain flora or fauna may play a key role in the local ecosystem. Other species may depend on the presence and proper functioning of these key species. As an example, the flowering of specific plants at specific times (such as Swamp Mahogany as one of the few canopy species flowering in winter) provides for consistent supply of nectar for a range of nectivorous species such as birds and possums.

Furthermore, a species may be very significant but not yet recognised by statutory mechanisms or in the literature. An example of this would be the Green Tree Frog (*Litoria caerulea*), which has been noted as being in decline in the Sydney Basin. In addition, a record of a particular species, or vegetation community, may be considered significant where it is at the edge of its range. There may also be species that have a local community profile that should afford special management provisions.

5.5 Habitat

There is a diversity of habitat across the landscape of the Liverpool Council area, with a number of ecological communities and a range of topography. This provides opportunities for refuge should a particular area be affected by fire or another disturbance. Connectivity between different remnants allows the movement of species during these times of stress and provides for exchange of genetic material between populations. The size of disconnected remnants is important for the overall sustainability of communities, species and populations. Corridor connections between remnants also provide for the sustainability of species, communities and populations. The impacts of the loss of these connections and gradual degradation of remnants often result in a gradual decline of species diversity and abundance.

Large numbers of isolated individual trees scattered around the area are significant in that they may provide habitat for arboreal mammals, rest stops and roosting sites for birds, and also contribute to decreasing the effects of land degradation, such as erosion and salinity. NPWS has indicated that these types of trees are crucial to the survival of many native bat species (pers. comm. L Vanderwallen, 2001). These trees may also have Aboriginal cultural heritage significance.

6. Threats to Conservation Values

1.1 Key Threatening Processes

The TSC Act, 1995 provides for the listing of Key Threatening Processes and the preparation of Threat Abatement Plans. Key Threatening Processes listed in Schedule 3 that apply to the Liverpool area are listed below:

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands (as described in the final determination of the Scientific Committee to list the threatening process)
- Anthropogenic Climate Change
- Bushrock removal (as described in the final determination of the Scientific Committee to list the threatening process)
- Clearing of native vegetation (as defined and described in the final determination of the Scientific Committee to list the key threatening process)
- Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus*
- Competition from feral honey bees, *Apis mellifera*

- High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition
- Importation of Red Imported Fire Ants *Solenopsis invicta*
- Infection by *Psittacine circoviral* (beak and feather) Disease affecting endangered psittacine species and populations
- Infection of native plants by *Phytophthora cinnamomi*
- Invasion of native plant communities by *Chrysanthemoides monilifera*
- Loss or degradation (or both) of sites used for hill-topping by butterflies
- Predation by *Gambusia holbrooki* (Plague Minnow or Mosquito Fish) (as described in the final determination of the Scientific Committee to list the threatening process)
- Predation by the European Red Fox *Vulpes vulpes*
- Predation by the Feral Cat *Felis catus*

This list is current as of 18/2/03, however the listings in the *Threatened Species Conservation Act, 1995* are being continually updated. The latest updates can be viewed at <http://www.npws.nsw.gov.au/wildlife>. It is important to note that other threatened processes may be operating in the Liverpool LGA that have not yet been listed. Council is obliged to consider/carry out actions under Threat Abatement Plans which apply to species or populations occurring in the area.

1.2 Threats to EEC's in the Liverpool LGA

As an LGA in a predominantly urban setting, the EEC's in Liverpool face a number of generic threats. These include:

- *The intensification of urban development.* The intensification of developed areas may cause removal of remnant trees and other vegetation. This could include the rezoning of land from standard residential to villas or medium density development, subdivision of existing parcels or a general increase in hard stand areas from building works/additions (extensions, additional garages, swimming pools, tennis courts and landscaping).
- *Edge effects.* Edge effects on the boundaries of EEC's include weed invasion, rubbish dumping, altered fire regimes, informal access and polluted stormwater. These edge effects impact the composition of the EEC and can affect the habitat quality of a remnant.
- *Weed invasion.* Weed invasion is not restricted to edge areas of a vegetation remnant – they can also be transported by stormwater, recreational users, birds or airborne dispersal. Growth of weeds is favoured in areas of changed soil nutrient and moisture, which usually results from stormwater pollution from pavement runoff, sewerage and drainage overflow (Webb, 1996). Native species that are not local to the area, or exotic plant species may also be

planted in bushland (either by private individuals or government land managers).

- *Planting of exotics.* Affect the habitat value of the area. May out compete with native species and may become garden escapes into natural bushland areas. Many exotics are deciduous and this provides pulse loads of nutrients to sensitive aquatic habitats.
- *Stormwater.* Stormwater impacts are more commonly known and difficult to adequately treat. The addition of sediments, nutrients and other pollution not only change the soil characteristics to create conditions unfavorable to native species adapted to low nutrient soils but facilitate weed establishment. Development also significantly affects the flow behaviour of streams and tributaries altering the downstream habitat qualities and conditions.
- *Inappropriate grounds management.* Grounds and land management practice may also significantly impact local EEC's. The most common is the removal of understorey and groundcover vegetation such as mowing beneath trees. This affects the age structure and composition of EECs ensuring reduced habitat quality and no replacement stock when existing canopy trees die out. The lack of strategic weed control programs will also affect the remnant EECs.
- *Inappropriate reserve planning.* Planning of reserves is critical to ensure the long-term sustainability of EECs in the Liverpool LGA. This may include the restriction of recreational access in some site specific areas, preventing vehicle access, fencing, minimising edge to area ratios, developing regeneration/rehabilitation programs, etc
- *Changed fire regimes.* Changed fire regimes as a result of wildfire or controlled burns can result in changes to dominant species and community species composition. These altered floristics can have a detrimental effect on the diversity and quality of EEC's in the Liverpool LGA. This can also lead to a predominance of fire dependant species, increased fire frequency, weed invasion, soil erosion and unnecessary air pollution (Webb, 1996).
- *Altered soil conditions.* Changed soil conditions due to soil disturbance and introduction of soil from outside sources will also have a direct effect on EEC's in the area. Compaction of soils by earthmoving equipment during maintenance, or during development, will also lead to problems with changed soil drainage and weed invasion of disturbed sites.
- *Broad scale developments.* Further threats to EEC's in the Liverpool LGA include broad scale developments such as new transport corridors and drainage channels. Ongoing threats will be the continued reduction in water quality, rubbish dumping, informal access, weed growth and direct human interference through inappropriate actions.

Other site-specific threats need to be identified and addressed on a case-by-case basis.

1.3 Noxious Weeds

Noxious weeds, formally declared under the *Noxious Weeds Act 1993*, are plants posing a threat to agriculture, the environment or the community. Noxious weeds are to be removed as soon as possible. There is a legal obligation for all public and private landholders to control noxious weeds on their properties. Responsibilities under the *Noxious Weeds Act, 1995* involve effective management of weeds in areas of private and public ownership, through direct action, regulation and education. Council must fulfil its statutory obligations by appropriately managing weeds in areas under Council's care, control or management. An up to date list of noxious weeds in the area should be referred to during any development assessment process conducted within the area. A full and comprehensive list of noxious weeds can be found at the Department of Agriculture Website (Dept of Agric, 2001).

Public Authorities may serve notice on occupiers of weed infested sites requiring them to carry out their weed control responsibilities. It is Council's duty to issue notices for weed control on privately owned land, in accordance with the *Noxious Weeds Act, 1993*.

Noxious weeds are classified into four control categories requiring varying levels of control/ eradication under the *Noxious Weeds Act, 1993*:

- **W1** - The presence of the weed on land must be notified to the local control authority immediately, and the weed must be fully and continuously suppressed and destroyed;
- **W2** - The weed must be fully and continuously suppressed and destroyed;
- **W3** - The weed must be prevented from spreading and its number and distribution reduced; or
- **W4** - The action specified in the declaration must be taken in respect of the weed.

Table 9 below lists the noxious weeds in Liverpool Council area declared under the *Noxious Weeds Act 1993*.

Table 8: Noxious Weeds in LCC

Common Name	Species Name	Control Category
Alligator weed	<i>Alternanthera philoxeroides</i>	W1
Bitou bush/ Boneseed	<i>Chrysanthemoides monilifera</i>	W3
Black knapweed	<i>Centaurea nigra</i>	W1
Blackberry	<i>Rubus fruticosus</i> (agg. spp.)	W2
Broomrape	<i>Orobanche</i> spp.	W1
Cabomba	<i>Cabomba</i> spp.	W4g
Castor oil plant	<i>Ricinus communis</i>	W2
Green cestrum	<i>Cestrum parqui</i>	W2
Harrisia cactus	<i>Harrisia</i> spp.	W4f
Hawkweed	<i>Hieracium</i> spp.	W1
Horsetail	<i>Equisetum</i> spp.	W1
Karoo thorn	<i>Acacia karroo</i>	W1
Kochia	<i>Kochia scoparia</i>	W1
Lagarosiphon	<i>Lagarosiphon major</i>	W1
Lantana (Pink flowered)	<i>Lantana camara</i>	W2
Lantana (Red flowered)	<i>Lantana camara</i>	W2
Ludwigia	<i>Ludwigia peruviana</i>	W2
Mexican feather grass	<i>Nassella tenuissima</i> syn <i>Stipa tenuissima</i>	W1
Miconia	<i>Miconia</i> spp.	W1
Pampas grass	<i>Cortaderia</i> spp.	W2
Parthenium weed	<i>Parthenium hysterophorus</i>	W1
Pellitory	<i>Parietaria judaica</i>	W3
Prickly pears	<i>Opuntia</i> spp.	W4f
Rhus tree	<i>Toxicodendron succedaneum</i>	W2
Salvinia	<i>Salvinia molesta</i>	W1
Senegal tea plant	<i>Gymnocoronis spilanthoides</i>	W1
Siam weed	<i>Chromolaena odorata</i>	W1
Spotted knapweed	<i>Centaurea maculosa</i>	W1
St John's wort	<i>Hypericum perforatum</i>	W2
Water hyacinth	<i>Eichhornia crassipes</i>	W1
Water lettuce	<i>Pistia stratiotes</i>	W1
Willows	<i>Salix</i> spp.	W4g



Conservation Targets Policy Framework

Liverpool City Council Biodiversity Strategy

August 2003



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1. Introduction

Managing ecological values and planning for biodiversity conservation is difficult in a complex landscape. Key requirements are:

- a knowledge of what the ecological values are,
- an understanding of their relative value, and
- developing specific targets, desired outcomes or performance objectives for these values.

The mapping prepared for the Liverpool City Council provides a comprehensive and valuable resource to assist decision makers in identifying what ecological values are where in the LGA. It relies on a consistent, repeatable, and acceptable methodology. It is not an exhaustive list of all the biodiversity values. The mapping uses vegetation communities as a surrogate for the broader spectrum of biodiversity values, an approach endorsed by NPWS and CSIRO.

The conservation assessment aims to provide an analysis of the relative priority of various communities and patches of vegetation across the LGA. It forms the basis of various strategy recommendations. Landuse planning and management decisions need to be cognisant not only of these values but the various objectives of the priority categories.

"If you can't measure it, you can't manage it"

To measure and monitor performance we need targets. Targets can provide a clear strategic direction, a quantifiable goal that enables decision makers to assess the context and relative significance of potential outcomes arising from their day to day decisions.

This paper provides an outline of targets developed for the Liverpool Biodiversity Strategy, their policy framework and relevant justification.

1.1 What is a Target?

'Targets' for biodiversity management are essential to provide for sustainable long-term land management guided by strategic conservation and development planning. Clearly defined conservation targets enable benchmarking and assessment of progress towards meeting them over time.

Terms like objectives, goals, plans, aims etc, although they assist in holding a picture or vision for the future for planning and management, are often generic and rarely provide solid direction for decision making that allows for measuring of performance.

A good target is:

- defined and measurable
- meaningful
- consistent with accepted scientific concepts
- achievable – realistic
- understood by those implementing (and preferably readily understandable by broader community)

- based on a repeatable methodology
- based on data available (to fit into current systems)
- key accountabilities are known

2. Policy Framework for Biodiversity Targets

There are many documents and policies that refer to principles and objectives for biodiversity management but few have set concrete measurable targets. The relevant Commonwealth and State framework for the development of biodiversity conservation targets is outlined below.

2.1 Commonwealth

1) In June 2001 Environment Australia published a comprehensive set of 'National Objectives and Targets for Biodiversity Conservation' that were signed off by State and Territory Governments. The targets can be applied to any land management region and are built on the principle of protecting a sample of the variety of ecosystems present, to ensure their long-term survival.

The targets provided for native vegetation and terrestrial ecosystems state that by 2003 Australia will have:

"clearing controls in place that prevent clearance of ecological communities with an extant below 30% of that present pre-1750;" and

"native vegetation restoration programs to recover ecological communities that are below 10% of that present pre-1750 or are nationally listed as critically endangered".

This provides a clear and measurable target within a recognised policy position. The effectiveness of these targets is dependent on the approach used to either control clearing or restore ecological communities.

2) The Commonwealth Government, in their National Forest Policy Statement (NFPS – signed in 1992) provide an undertaking to manage Australia's forests to conserve biological diversity. In order to achieve this it was agreed that a comprehensive, adequate and representative (CAR) reserve system be created (JANIS, 1997 – a Commonwealth-State committee addressing the implementation of the NFPS).

The JANIS criteria for a CAR reserve system included numerical targets. Relevant numerical targets include:

- 15% of pre-1750 distribution of forest ecosystems,
- at least 60% of vulnerable ecosystems, and
- 100% of rare and endangered forest ecosystems.

Vulnerable ecosystems are defined as "approaching a reduction in aerial 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.

A rare ecosystem is one where its geographic distribution involves:

- a total range generally less than 10,000 hectares
- a total area of generally less than 1000 hectares, or
- patch sizes of generally less than 100 hectares (where such patches do not aggregate to form significant areas)

An **endangered** ecosystem is described as one where:

- its distribution has contracted to less than 10% of the pre1750 distribution (former range)
- the total area has contracted to less than 10% of its former area, or
- 90% of its area is in small patches which are subject to threatening processes and unlikely to persist

Other criteria raised in the JANIS process that could be considered relevant to this project include:

- Reserved areas should be replicated across the geographic range.
- Maximise the area of high quality habitat for all known elements of biodiversity.
- Reserves should be large enough to sustain the viability, quality and integrity of populations.
- Sample the full range of biological variation within each forest ecosystem.
- In fragmented landscapes, remnants that contribute to sampling the full range of biodiversity are vital parts of a forest reserve system.

The NFPS recognises the need to promote the management of forests on private land to meet the conservation goals. It is important to stress that its focus is on forests and not other communities such as heath, grassland, wetlands etc.

The targets and criteria developed under JANIS could be applied to Liverpool City Council. They have a sound scientific basis that was developed over some time. They provide more specific targets for reservation that slide depending on the extent of clearing and risk. The application of reservation would need to be looked at to ensure that it focuses on viable patches and that there are processes to support the implementation.

2.2 State

The 'National Objectives and Targets for Biodiversity Conservation' and the principles of a CAR reserve system (above) have been endorsed at both the Commonwealth and State level.

1) The 'NSW Biodiversity Strategy' provides a considerable list of 'strategic goals', 'core objectives', principles and targets. The targets have not been developed for application to an LGA scale and are not quantifiable but provide direction on the principles and objectives of biodiversity planning and management.

2) The recent government initiative, 'Plan First' aims to provide opportunities to consolidate many regional plans and strategies to provide a single instrument. Areas and targets identified through a regional or local conservation assessment process should be appropriately managed in any revised regional or local instrument.

3) The NSW *Threatened Species Conservation Act, 1995* (TSC Act) contains provisions for the preparation and implementation of Recovery Plans. A Recovery Plan seeks to involve land managers such as Council to co-operatively protect, manage and promote the recovery of the threatened species, population or ecological community. The plans

could adopt targets for a species, population or community where it is considered appropriate.

The recovery plan for Endangered Ecological Communities on the Cumberland Plain is currently in preparation. It is understood that it is seeking a recovery of each vegetation community with a target of 30% of the pre European (pre-1750) distribution. It is important to note that some communities on the Cumberland Plain have less than 10% of the pre-1750 distribution remaining.

4) The *Native Vegetation Conservation Act, 1997* (NVC Act) provides for the development of Regional Vegetation Management Plans (RVMPs). The process may incorporate targets in the conservation assessment and then specify clearing controls for various categories (high environmental significance, medium etc) of land in the instrument. The Act only covers part of the Liverpool LGA.

DLWC have prepared a series of technical papers to support Regional Vegetation Committees and they advocate a different approach where a 30/40/30 ratio is adopted. This refers to targets where 30% of the landscape is available for intensive use, 40% for complimentary uses and 30% for protection (of which 15% is in reserves and 15% in covenants Voluntary Conservation Agreements (VCAs) etc). Recommendations for a higher overall coverage is provided to accommodate shifts in condition from major events eg fire, cumulative impacts of threatening process eg weeds, and major land use changes planned and otherwise.

This approach does not focus on ecosystems but cover of vegetation across the landscape. It does not however define how it determines what a 'landscape' is, so it is assumed that it refers to a definable land system like a floodplain or a mountain range, etc. It appears to be developed for more rural areas where a large proportion (40%) is targeted for the middle category, which may be more difficult to achieve for the urban/rural interface.

It is understood that State government is developing this landscape approach further however no formal position has been released. Preliminary discussions have identified that landscapes are likely to be delineated by geology.

Translation of these state derived targets across numerous LGAs and land managers has not been addressed and it raises many issues of application.

2.3 Regional

The South Sydney Catchment Blueprint contains the following relevant catchment targets.

Table shows –Target to be met by improve management of the natural environment in the catchment to achieve

Category	Measures
Clay	By 2012 an increase of 25% in bushland cover
	By 2012 80% of bushland cover to be good to excellent quality
	By 2012 a 50% improvement in connectivity between and within bushland
Coastal	From 2002 no clearing of Endangered Ecological Communities
	From 2002 No Net Loss principle applied to other Ecological Communities
	By 2012 an increase of 25% in bushland cover
	By 2012 80% of bushland cover to be of high to excellent quality
Sandstone Woronora Plateau - Commonwealth and SCA lands	By 2012 a 10% improvement in connectivity between and within bushland
	From 2002 No Net Loss of bushland
	95% of bushland cover to be high to excellent quality by 2012
Sandstone Woronora Plateau - Other Areas	Maintenance of connectivity
	By 2012 an increase of 10% in bushland cover
	By 2012 80% of bushland cover to be good to excellent quality
Riparian	By 2012 a 20% improvement in connectivity between and within bushland
	From 2002 No Net Loss of existing high quality vegetation
	By 2012 60% of stream length with adequate riparian zones (50 metres width large streams, 20 metres width other streams)
	By 2012 50% of public riparian zones to be good to excellent quality
Aquatic- Marine/Estuarine	By 2012 80% of private riparian zones to be medium to good quality
	From 2002 No Net Loss principle applied to all habitats
	By 2012 measurable increase in area of significant habitats
	By 2012 measurable improvement in overall quality of all habitats
Aquatic- Fresh Fresh water streams Fresh water wetlands	By 2012 measurable increase in connectivity within and between all habitats
	From 2002 No Net Loss principle applied to all habitats
	By 2012 measurable improvement in habitat and biodiversity values for all fresh water ecosystems

Soil and Sediment	By 2012 a net reduction of human induced soil erosion over the Board area and ecologically sustainable levels of sediment entering the waterways
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The NSW NPWS are working towards developing draft conservation targets for the Endangered Ecological Communities of Western Sydney.

In their preliminary working draft Recovery Plan NPWS divide Endangered Ecological Communities into Endangered and Critically Endangered (where the total extent of the community is less than 3000 hectares).

- Critically endangered: Castlereagh Ironbark Forest, Cooks River Clay Plain Scrub Forest, Castlereagh Swamp Woodland, Agnes Banks Woodland, Western Sydney Dry Rainforest, Moist Shale Woodland, Turpentine Ironbark Forest, Turpentine Ironbark Margin Forest, Shale Gravel Transition Forest, Blue Gum High Forest and Elderslie Banksia Scrub
- Endangered: Shale Sandstone Transition Forest (Low Sandstone Influence), Shale Sandstone Transition Forest (High Sandstone Influence), Shale Hills Woodland, Shale Plains Woodland, Alluvial Woodland, and Riparian Forest

In general, the NPWS considers that critically endangered communities require retention of all remaining remnants to prevent compromise of their recovery. Endangered communities, however, can probably afford to lose a small proportion of their distributions without compromising recovery, especially if that loss was in the form of scattered small remnants which were unlikely to be viable on the long term..

NPWS considers that it would be acceptable to lose remnants of Endangered Ecological Communities less than 2 hectares in size, but that loss remnants between 2 and 5 hectares in size would not be acceptable.

The NPWS considers that, when the percentage of an endangered community remaining in a LGA is less than half of the percentage remaining across its range, then all of the community within that LGA is required to be targeted for conservation.

Preliminary consultation with State agencies has suggested targets for Liverpool to include:

- Retention of all 'Core' vegetation (including Regional, Local and Urban Remnant core)
- No net loss of 'Support for Core' vegetation
- Enhancement and Restoration activities to be directed to 'Support for Core' vegetation
- Where clearing of 'Support for Core' occurs, offsetting ratios will determine how much other Support for Core vegetation is to be restored
- Increase in the length of viable aquatic habitat

NPWS consider that any future targets they may set should be treated as a minimum. Additional local studies are recommended to set targets for local areas.

3. Targets for the Liverpool LGA

The following targets for vegetation communities have been developed for Liverpool City Council. They have been derived from an analysis of the existing vegetation, how much remains, what condition it is in and what proportion is found in each of the zones. Overall the targets provide for a net increase in the area of good condition vegetation and increase the amount of this that is protected. Explanations of key terms are included below.

Vegetation Community	Targets – by 2008	
	Hectares of ABC Condition	Hectares of ABC Condition in formal protection*
Alluvial Woodland	720	50%
Castlereagh Ironbark Forest (including Cooks River Clay Plain Scrub Forest)	190	50%
Castlereagh Scribbly Gum Woodland	240	50%
Castlereagh Swamp Woodland	34	50%
Moist Shale Woodland	7.35	100%
Riparian Forest	111	50%
Riparian Scrub	75	100%
Shale Gravel Transition Forest	720	50%
Shale Hills Woodland	710	50%
Shale Plains Woodland	1200	50%
Shale Sandstone Transition Forest (high sandstone influence)	11	60%
Shale Sandstone Transition Forest (low sandstone influence)	100	75%

***Protection** – includes:

- Reservation under the National Parks and Wildlife Act,
- Zoning as recreation (6), environmental protection (7),
- Identified within SREP 31,
- Voluntary Conservation Agreements (VCAs), or
- lands with a conservation agreement under covenant on the title

4. Objectives and Performance Criteria

4.1 Regional Core

These lands are considered significant to achieving State biodiversity conservation and management goals.

The table below shows the vegetation included.

Condition	Community	Patch Size	Connectivity
ABC	Endangered Ecological Communities (Critically Endangered*)	NA	NA
	Endangered Ecological Communities (Other)	>10 ha	NA
	Non Listed Communities	>100ha	NA
	Non Listed Communities	<100ha	Adjacent to other Core
TX, TXR	Endangered Ecological Communities (Critically Endangered)	NA	NA
Any	Freshwater Wetlands	NA	NA

Objective

- To protect remaining 'Regional Core' vegetation,
- No trading or offsets permitted unless considered to be a social and economic benefit of state significance,
- To protect and restore buffer areas to 'Regional Core' vegetation, and
- To protect the contribution 'Regional Core' vegetation has to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to 'Regional Core' lands where that action:

- leads to a long-term adverse affect on Regional Core vegetation, or
- reduces the extent of Regional Core vegetation, or
- fragments an occurrence of Regional Core vegetation, or
- adversely affects habitat critical to the survival Regional Core vegetation, or
- modifies or destroys abiotic factors (such as water, nutrients, or soil) necessary for the survival of Regional Core vegetation, or
- results in invasive species that are harmful to Regional Core vegetation becoming established in an occurrence of these lands, or
- diminishes the capacity of a buffer area adjacent to Regional Core vegetation, or
- adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to Regional Core vegetation where the requirements under the TSC Act have not been met.

4.2 Local Core

These lands are considered significant to achieving local conservation and management goals.

The table below shows the vegetation included.

Condition	Community	Patch Size	Connectivity
ABC	Endangered Ecological Communities (Other)	2-10 ha	NA

Objectives

- No net loss of 'Local Core' vegetation,
- Some flexibility for trading and offsets,
- To protect the viable remnants of 'Local Core',
- To restore 'Support for Core' when 'Local Core' is to be cleared (ratios apply), and
- To protect the contribution 'Local Core' lands have to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to Local Core lands where that action:

- leads to a long-term adverse affect on Local Core vegetation, or
- reduces the extent of a Local Core vegetation, or
- fragments an occurrence of the Local Core vegetation, or
- adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to Local Core vegetation where the requirements under the TSC Act have not been met.

4.3 Core - Urban Remnants

These are generally small isolated remnants of Critically Endangered Ecological Communities in Urban areas. The canopy remains but no Understorey is present.

The table below shows the vegetation included.

Condition	Community	Patch Size	Connectivity
TXU	Endangered Ecological Communities (Critically Endangered)	NA	NA

Objectives

- To protect and retain these 'Core – Urban Remnants' within an urban setting,
- No net loss of 'Core – Urban Remnants',
- To protect the contribution 'Core – Urban Remnants' have to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to 'Core – Urban Remnants' where that action:

- reduces the extent of Core – Urban Remnants, or
- adversely affects the capacity of a regional connectivity area and riparian corridor.

A person must not take an action in or adjacent to Core – Urban Remnants where the requirements under the TSC Act have not been met.

4.4 Support for Core

These are patches of vegetation that are in poorer condition but are adjacent to Core lands. They have values in buffering and, in the longer term, increasing the size of Core.

The table below shows the vegetation included in 'Support for Core' lands.

Condition	Community	Patch Size	Connectivity
TX, TXR	Endangered Ecological Communities (Other)	NA	Adjacent to Core
	Non Listed Communities	NA	Adjacent to Core

Objectives

- To maintain 'Support for Core' vegetation remnants as buffer and protection for Core vegetation,
- Some flexibility for trading and offsets,
- To restore 'Support for Core' remnants to good condition, and
- To protect the contribution 'Support for Core' lands have to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to 'Support for Core' lands where that action:

- reduces the extent of Support for Core vegetation except where it involves enhancing its condition, or
- fragments an occurrence of the Support for Core vegetation, or
- modifies or destroys abiotic factors (such as water, nutrients, or soil) necessary for the survival of Support for Core vegetation, or

- results in invasive species that are harmful to Support for Core vegetation becoming established in an occurrence of these lands, or
- diminishes the capacity of a buffer area adjacent to Regional Core vegetation, or
- adversely affects the capacity of a regional connectivity area and riparian corridor.

A person must not take an action in or adjacent to Support for Core vegetation where the requirements under the TSC Act have not been met.

4.5 Riparian Corridors

Vegetation along streams has many values, including protection of in-stream habitat, prevention of soil erosion and often provides highly valuable habitat areas.

Objectives

- To protect and manage existing good condition vegetation remnants in 'Riparian Corridors',
- To restore degraded vegetation in 'Riparian Corridors',
- To regenerate vegetation in cleared areas along 'Riparian Corridors'
- To protect and restore buffer areas to vegetation in the 'Riparian Corridors',
- To identify, protect and manage the aquatic ecological values, and
- To protect the linkages provided by 'Riparian Corridors'.

Performance Measures

A person must not take an action in or adjacent to lands mapped as Riparian Corridors where that action:

- leads to a long-term adverse affect on good condition native vegetation within the Riparian Corridors, or
- reduces the extent of vegetation within the Riparian Corridors, or
- fragments an occurrence of vegetation within the Riparian Corridors, or
- modifies or destroys abiotic factors (such as water, nutrients, or soil) necessary for the survival of vegetation within the Riparian Corridors, or
- results in invasive species that are harmful to Riparian Corridors becoming established in an occurrence of these lands, or
- diminishes the capacity of a buffer area adjacent to Riparian Corridors, or
- adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to Regional Core vegetation where the requirements under the TSC Act, Fisheries Management Act and Rivers and Foreshore Improvement Act (or Water Management Act when it repeals the RFI Act) have not been met.

4.6 Regional Connectivity Areas

'Regional Connectivity Areas' are sets of vegetation remnants that are in close proximity to large Regional and Local Core lands. These areas are the best opportunities to consolidate existing vegetation into large blocks of habitat through restoration and replanting.

Objectives

- To protect and manage existing good condition vegetation remnants in 'Regional Connectivity Areas',
- To protect the linkages provided by 'Regional Connectivity Areas',
- To restore degraded vegetation, and
- To regenerate vegetation in cleared areas.

Performance Measures

A person must not take an action in or adjacent to lands mapped as Regional Connectivity Areas where that action:

- leads to a long-term adverse affect on good condition native vegetation within the Regional Connectivity Areas, or
- reduces the extent of vegetation within the Regional Connectivity Areas, or
- adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to vegetation within Regional Connectivity Areas where the requirements under the TSC Act have not been met.



Conservation Targets Policy Framework

Liverpool City Council Biodiversity Strategy

August 2003



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1. Introduction

Managing ecological values and planning for biodiversity conservation is difficult in a complex landscape. Key requirements are:

- a knowledge of what the ecological values are,
- an understanding of their relative value, and
- developing specific targets, desired outcomes or performance objectives for these values.

The mapping prepared for the Liverpool City Council provides a comprehensive and valuable resource to assist decision makers in identifying what ecological values are where in the LGA. It relies on a consistent, repeatable, and acceptable methodology. It is not an exhaustive list of all the biodiversity values. The mapping uses vegetation communities as a surrogate for the broader spectrum of biodiversity values, an approach endorsed by NPWS and CSIRO.

The conservation assessment aims to provide an analysis of the relative priority of various communities and patches of vegetation across the LGA. It forms the basis of various strategy recommendations. Landuse planning and management decisions need to be cognisant not only of these values but the various objectives of the priority categories.

"If you can't measure it, you can't manage it"

To measure and monitor performance we need targets. Targets can provide a clear strategic direction, a quantifiable goal that enables decision makers to assess the context and relative significance of potential outcomes arising from their day to day decisions.

This paper provides an outline of targets developed for the Liverpool Biodiversity Strategy, their policy framework and relevant justification.

1.1 What is a Target?

'Targets' for biodiversity management are essential to provide for sustainable long-term land management guided by strategic conservation and development planning. Clearly defined conservation targets enable benchmarking and assessment of progress towards meeting them over time.

Terms like objectives, goals, plans, aims etc, although they assist in holding a picture or vision for the future for planning and management, are often generic and rarely provide solid direction for decision making that allows for measuring of performance.

A good target is:

- defined and measurable
- meaningful
- consistent with accepted scientific concepts
- achievable – realistic
- understood by those implementing (and preferably readily understandable by broader community)

- based on a repeatable methodology
- based on data available (to fit into current systems)
- key accountabilities are known

2. Policy Framework for Biodiversity Targets

There are many documents and policies that refer to principles and objectives for biodiversity management but few have set concrete measurable targets. The relevant Commonwealth and State framework for the development of biodiversity conservation targets is outlined below.

2.1 Commonwealth

1) In June 2001 Environment Australia published a comprehensive set of 'National Objectives and Targets for Biodiversity Conservation' that were signed off by State and Territory Governments. The targets can be applied to any land management region and are built on the principle of protecting a sample of the variety of ecosystems present, to ensure their long-term survival.

The targets provided for native vegetation and terrestrial ecosystems state that by 2003 Australia will have:

"clearing controls in place that prevent clearance of ecological communities with an extant below 30% of that present pre-1750;" and

"native vegetation restoration programs to recover ecological communities that are below 10% of that present pre-1750 or are nationally listed as critically endangered".

This provides a clear and measurable target within a recognised policy position. The effectiveness of these targets is dependent on the approach used to either control clearing or restore ecological communities.

2) The Commonwealth Government, in their National Forest Policy Statement (NFPS – signed in 1992) provide an undertaking to manage Australia's forests to conserve biological diversity. In order to achieve this it was agreed that a comprehensive, adequate and representative (CAR) reserve system be created (JANIS, 1997 – a Commonwealth-State committee addressing the implementation of the NFPS).

The JANIS criteria for a CAR reserve system included numerical targets. Relevant numerical targets include:

- 15% of pre-1750 distribution of forest ecosystems,
- at least 60% of vulnerable ecosystems, and
- 100% of rare and endangered forest ecosystems.

Vulnerable ecosystems are defined as "approaching a reduction in aerial 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.

A rare ecosystem is one where its geographic distribution involves:

- a total range generally less than 10,000 hectares
- a total area of generally less than 1000 hectares, or
- patch sizes of generally less than 100 hectares (where such patches do not aggregate to form significant areas)

An **endangered** ecosystem is described as one where:

- its distribution has contracted to less than 10% of the pre1750 distribution (former range)
- the total area has contracted to less than 10% of its former area, or
- 90% of its area is in small patches which are subject to threatening processes and unlikely to persist

Other criteria raised in the JANIS process that could be considered relevant to this project include:

- Reserved areas should be replicated across the geographic range.
- Maximise the area of high quality habitat for all known elements of biodiversity.
- Reserves should be large enough to sustain the viability, quality and integrity of populations.
- Sample the full range of biological variation within each forest ecosystem.
- In fragmented landscapes, remnants that contribute to sampling the full range of biodiversity are vital parts of a forest reserve system.

The NFPS recognises the need to promote the management of forests on private land to meet the conservation goals. It is important to stress that its focus is on forests and not other communities such as heath, grassland, wetlands etc.

The targets and criteria developed under JANIS could be applied to Liverpool City Council. They have a sound scientific basis that was developed over some time. They provide more specific targets for reservation that slide depending on the extent of clearing and risk. The application of reservation would need to be looked at to ensure that it focuses on viable patches and that there are processes to support the implementation.

2.2 State

The 'National Objectives and Targets for Biodiversity Conservation' and the principles of a CAR reserve system (above) have been endorsed at both the Commonwealth and State level.

1) The 'NSW Biodiversity Strategy' provides a considerable list of 'strategic goals', 'core objectives', principles and targets. The targets have not been developed for application to an LGA scale and are not quantifiable but provide direction on the principles and objectives of biodiversity planning and management.

2) The recent government initiative, 'Plan First' aims to provide opportunities to consolidate many regional plans and strategies to provide a single instrument. Areas and targets identified through a regional or local conservation assessment process should be appropriately managed in any revised regional or local instrument.

3) The NSW *Threatened Species Conservation Act, 1995* (TSC Act) contains provisions for the preparation and implementation of Recovery Plans. A Recovery Plan seeks to involve land managers such as Council to co-operatively protect, manage and promote the recovery of the threatened species, population or ecological community. The plans

could adopt targets for a species, population or community where it is considered appropriate.

The recovery plan for Endangered Ecological Communities on the Cumberland Plain is currently in preparation. It is understood that it is seeking a recovery of each vegetation community with a target of 30% of the pre European (pre-1750) distribution. It is important to note that some communities on the Cumberland Plain have less than 10% of the pre-1750 distribution remaining.

4) The *Native Vegetation Conservation Act, 1997* (NVC Act) provides for the development of Regional Vegetation Management Plans (RVMPs). The process may incorporate targets in the conservation assessment and then specify clearing controls for various categories (high environmental significance, medium etc) of land in the instrument. The Act only covers part of the Liverpool LGA.

DLWC have prepared a series of technical papers to support Regional Vegetation Committees and they advocate a different approach where a 30/40/30 ratio is adopted. This refers to targets where 30% of the landscape is available for intensive use, 40% for complimentary uses and 30% for protection (of which 15% is in reserves and 15% in covenants Voluntary Conservation Agreements (VCAs) etc). Recommendations for a higher overall coverage is provided to accommodate shifts in condition from major events eg fire, cumulative impacts of threatening process eg weeds, and major land use changes planned and otherwise.

This approach does not focus on ecosystems but cover of vegetation across the landscape. It does not however define how it determines what a 'landscape' is, so it is assumed that it refers to a definable land system like a floodplain or a mountain range, etc. It appears to be developed for more rural areas where a large proportion (40%) is targeted for the middle category, which may be more difficult to achieve for the urban/rural interface.

It is understood that State government is developing this landscape approach further however no formal position has been released. Preliminary discussions have identified that landscapes are likely to be delineated by geology.

Translation of these state derived targets across numerous LGAs and land managers has not been addressed and it raises many issues of application.

2.3 Regional

The South Sydney Catchment Blueprint contains the following relevant catchment targets.

Table shows –Target to be met by improve management of the natural environment in the catchment to achieve

Category	Measures
Clay	By 2012 an increase of 25% in bushland cover
	By 2012 80% of bushland cover to be good to excellent quality
	By 2012 a 50% improvement in connectivity between and within bushland
Coastal	From 2002 no clearing of Endangered Ecological Communities
	From 2002 No Net Loss principle applied to other Ecological Communities
	By 2012 an increase of 25% in bushland cover
	By 2012 80% of bushland cover to be of high to excellent quality
Sandstone Woronora Plateau - Commonwealth and SCA lands	By 2012 a 10% improvement in connectivity between and within bushland
	From 2002 No Net Loss of bushland
	95% of bushland cover to be high to excellent quality by 2012
Sandstone Woronora Plateau - Other Areas	Maintenance of connectivity
	By 2012 an increase of 10% in bushland cover
	By 2012 80% of bushland cover to be good to excellent quality
Riparian	By 2012 a 20% improvement in connectivity between and within bushland
	From 2002 No Net Loss of existing high quality vegetation
	By 2012 60% of stream length with adequate riparian zones (50 metres width large streams, 20 metres width other streams)
	By 2012 50% of public riparian zones to be good to excellent quality
Aquatic- Marine/Estuarine	By 2012 80% of private riparian zones to be medium to good quality
	From 2002 No Net Loss principle applied to all habitats
	By 2012 measurable increase in area of significant habitats
	By 2012 measurable improvement in overall quality of all habitats
Aquatic- Fresh Fresh water streams Fresh water wetlands	By 2012 measurable increase in connectivity within and between all habitats
	From 2002 No Net Loss principle applied to all habitats
	By 2012 measurable improvement in habitat and biodiversity values for all fresh water ecosystems

Soil and Sediment	By 2012 a net reduction of human induced soil erosion over the Board area and ecologically sustainable levels of sediment entering the waterways
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The NSW NPWS are working towards developing draft conservation targets for the Endangered Ecological Communities of Western Sydney.

In their preliminary working draft Recovery Plan NPWS divide Endangered Ecological Communities into Endangered and Critically Endangered (where the total extent of the community is less than 3000 hectares).

- Critically endangered: Castlereagh Ironbark Forest, Cooks River Clay Plain Scrub Forest, Castlereagh Swamp Woodland, Agnes Banks Woodland, Western Sydney Dry Rainforest, Moist Shale Woodland, Turpentine Ironbark Forest, Turpentine Ironbark Margin Forest, Shale Gravel Transition Forest, Blue Gum High Forest and Elderslie Banksia Scrub
- Endangered: Shale Sandstone Transition Forest (Low Sandstone Influence), Shale Sandstone Transition Forest (High Sandstone Influence), Shale Hills Woodland, Shale Plains Woodland, Alluvial Woodland, and Riparian Forest

In general, the NPWS considers that critically endangered communities require retention of all remaining remnants to prevent compromise of their recovery. Endangered communities, however, can probably afford to lose a small proportion of their distributions without compromising recovery, especially if that loss was in the form of scattered small remnants which were unlikely to be viable on the long term..

NPWS considers that it would be acceptable to lose remnants of Endangered Ecological Communities less than 2 hectares in size, but that loss remnants between 2 and 5 hectares in size would not be acceptable.

The NPWS considers that, when the percentage of an endangered community remaining in a LGA is less than half of the percentage remaining across its range, then all of the community within that LGA is required to be targeted for conservation.

Preliminary consultation with State agencies has suggested targets for Liverpool to include:

- Retention of all 'Core' vegetation (including Regional, Local and Urban Remnant core)
- No net loss of 'Support for Core' vegetation
- Enhancement and Restoration activities to be directed to 'Support for Core' vegetation
- Where clearing of 'Support for Core' occurs, offsetting ratios will determine how much other Support for Core vegetation is to be restored
- Increase in the length of viable aquatic habitat

NPWS consider that any future targets they may set should be treated as a minimum. Additional local studies are recommended to set targets for local areas.

3. Targets for the Liverpool LGA

The following targets for vegetation communities have been developed for Liverpool City Council. They have been derived from an analysis of the existing vegetation, how much remains, what condition it is in and what proportion is found in each of the zones. Overall the targets provide for a net increase in the area of good condition vegetation and increase the amount of this that is protected. Explanations of key terms are included below.

Vegetation Community	Targets – by 2008	
	Hectares of ABC Condition	Hectares of ABC Condition in formal protection*
Alluvial Woodland	720	50%
Castlereagh Ironbark Forest (including Cooks River Clay Plain Scrub Forest)	190	50%
Castlereagh Scribbly Gum Woodland	240	50%
Castlereagh Swamp Woodland	34	50%
Moist Shale Woodland	7.35	100%
Riparian Forest	111	50%
Riparian Scrub	75	100%
Shale Gravel Transition Forest	720	50%
Shale Hills Woodland	710	50%
Shale Plains Woodland	1200	50%
Shale Sandstone Transition Forest (high sandstone influence)	11	60%
Shale Sandstone Transition Forest (low sandstone influence)	100	75%

***Protection** – includes:

- Reservation under the National Parks and Wildlife Act,
- Zoning as recreation (6), environmental protection (7),
- Identified within SREP 31,
- Voluntary Conservation Agreements (VCAs), or
- lands with a conservation agreement under covenant on the title

4. Objectives and Performance Criteria

4.1 Regional Core

These lands are considered significant to achieving State biodiversity conservation and management goals.

The table below shows the vegetation included.

Condition	Community	Patch Size	Connectivity
ABC	Endangered Ecological Communities (Critically Endangered*)	NA	NA
	Endangered Ecological Communities (Other)	>10 ha	NA
	Non Listed Communities	>100ha	NA
	Non Listed Communities	<100ha	Adjacent to other Core
TX, TXR	Endangered Ecological Communities (Critically Endangered)	NA	NA
Any	Freshwater Wetlands	NA	NA

Objective

- To protect remaining 'Regional Core' vegetation,
- No trading or offsets permitted unless considered to be a social and economic benefit of state significance,
- To protect and restore buffer areas to 'Regional Core' vegetation, and
- To protect the contribution 'Regional Core' vegetation has to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to 'Regional Core' lands where that action:

- leads to a long-term adverse affect on Regional Core vegetation, or
- reduces the extent of Regional Core vegetation, or
- fragments an occurrence of Regional Core vegetation, or
- adversely affects habitat critical to the survival Regional Core vegetation, or
- modifies or destroys abiotic factors (such as water, nutrients, or soil) necessary for the survival of Regional Core vegetation, or
- results in invasive species that are harmful to Regional Core vegetation becoming established in an occurrence of these lands, or
- diminishes the capacity of a buffer area adjacent to Regional Core vegetation, or
- adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to Regional Core vegetation where the requirements under the TSC Act have not been met.

4.2 Local Core

These lands are considered significant to achieving local conservation and management goals.

The table below shows the vegetation included.

Condition	Community	Patch Size	Connectivity
ABC	Endangered Ecological Communities (Other)	2-10 ha	NA

Objectives

- No net loss of 'Local Core' vegetation,
- Some flexibility for trading and offsets,
- To protect the viable remnants of 'Local Core',
- To restore 'Support for Core' when 'Local Core' is to be cleared (ratios apply), and
- To protect the contribution 'Local Core' lands have to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to Local Core lands where that action:

- leads to a long-term adverse affect on Local Core vegetation, or
- reduces the extent of a Local Core vegetation, or
- fragments an occurrence of the Local Core vegetation, or
- adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to Local Core vegetation where the requirements under the TSC Act have not been met.

4.3 Core - Urban Remnants

These are generally small isolated remnants of Critically Endangered Ecological Communities in Urban areas. The canopy remains but no Understorey is present.

The table below shows the vegetation included.

Condition	Community	Patch Size	Connectivity
TXU	Endangered Ecological Communities (Critically Endangered)	NA	NA

Objectives

- To protect and retain these 'Core – Urban Remnants' within an urban setting,
- No net loss of 'Core – Urban Remnants',
- To protect the contribution 'Core – Urban Remnants' have to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to 'Core – Urban Remnants' where that action:

- reduces the extent of Core – Urban Remnants, or
- adversely affects the capacity of a regional connectivity area and riparian corridor.

A person must not take an action in or adjacent to Core – Urban Remnants where the requirements under the TSC Act have not been met.

4.4 Support for Core

These are patches of vegetation that are in poorer condition but are adjacent to Core lands. They have values in buffering and, in the longer term, increasing the size of Core.

The table below shows the vegetation included in 'Support for Core' lands.

Condition	Community	Patch Size	Connectivity
TX, TXR	Endangered Ecological Communities (Other)	NA	Adjacent to Core
	Non Listed Communities	NA	Adjacent to Core

Objectives

- To maintain 'Support for Core' vegetation remnants as buffer and protection for Core vegetation,
- Some flexibility for trading and offsets,
- To restore 'Support for Core' remnants to good condition, and
- To protect the contribution 'Support for Core' lands have to regional connectivity areas and riparian corridors.

Performance Measures

A person must not take an action in or adjacent to 'Support for Core' lands where that action:

- reduces the extent of Support for Core vegetation except where it involves enhancing its condition, or
- fragments an occurrence of the Support for Core vegetation, or
- modifies or destroys abiotic factors (such as water, nutrients, or soil) necessary for the survival of Support for Core vegetation, or

- results in invasive species that are harmful to Support for Core vegetation becoming established in an occurrence of these lands, or
- diminishes the capacity of a buffer area adjacent to Regional Core vegetation, or
- adversely affects the capacity of a regional connectivity area and riparian corridor.

A person must not take an action in or adjacent to Support for Core vegetation where the requirements under the TSC Act have not been met.

4.5 Riparian Corridors

Vegetation along streams has many values, including protection of in-stream habitat, prevention of soil erosion and often provides highly valuable habitat areas.

Objectives

- To protect and manage existing good condition vegetation remnants in 'Riparian Corridors',
- To restore degraded vegetation in 'Riparian Corridors',
- To regenerate vegetation in cleared areas along 'Riparian Corridors'
- To protect and restore buffer areas to vegetation in the 'Riparian Corridors',
- To identify, protect and manage the aquatic ecological values, and
- To protect the linkages provided by 'Riparian Corridors'.

Performance Measures

A person must not take an action in or adjacent to lands mapped as Riparian Corridors where that action:

- leads to a long-term adverse affect on good condition native vegetation within the Riparian Corridors, or
- reduces the extent of vegetation within the Riparian Corridors, or
- fragments an occurrence of vegetation within the Riparian Corridors, or
- modifies or destroys abiotic factors (such as water, nutrients, or soil) necessary for the survival of vegetation within the Riparian Corridors, or
- results in invasive species that are harmful to Riparian Corridors becoming established in an occurrence of these lands, or
- diminishes the capacity of a buffer area adjacent to Riparian Corridors, or
- adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to Regional Core vegetation where the requirements under the TSC Act, Fisheries Management Act and Rivers and Foreshore Improvement Act (or Water Management Act when it repeals the RFI Act) have not been met.

4.6 Regional Connectivity Areas

'Regional Connectivity Areas' are sets of vegetation remnants that are in close proximity to large Regional and Local Core lands. These areas are the best opportunities to consolidate existing vegetation into large blocks of habitat through restoration and replanting.

Objectives

- To protect and manage existing good condition vegetation remnants in 'Regional Connectivity Areas',
- To protect the linkages provided by 'Regional Connectivity Areas',
- To restore degraded vegetation, and
- To regenerate vegetation in cleared areas.

Performance Measures

A person must not take an action in or adjacent to lands mapped as Regional Connectivity Areas where that action:

- leads to a long-term adverse affect on good condition native vegetation within the Regional Connectivity Areas, or
- reduces the extent of vegetation within the Regional Connectivity Areas, or
- adversely affects the capacity of a regional connectivity area or riparian corridor.

A person must not take an action in or adjacent to vegetation within Regional Connectivity Areas where the requirements under the TSC Act have not been met.



Corridors and Connectivity

Liverpool City Council Biodiversity Strategy

August 2003



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1. Importance of Wildlife Corridors

Extensive habitat fragmentation has occurred during settlement of Western Sydney such that a few fragmented remnants remain of what were healthy and diverse ecosystems such as the Cumberland Plain Woodlands (Seidlich 1997). These pockets are under severe threat from clearing and degradation from the surrounding urban environment. It is known that increased size of habitat area enhances available resources and allows more ecosystem niches therefore supporting more species and larger populations (Seidlich 1997). This is key to managing species loss from bushland remnants. The effective size of remnants can be increased by increasing patch size, building connectivity back into the landscape and linking up adjacent remnants with corridors, to allow dispersal between them.

1.1 What are corridors?

Corridors are native linear landscape features that connect two or more, larger habitat patches, allowing either movement of individuals, or gene-flow among native flora and fauna – thereby maintaining healthy populations and biological diversity (Seidlich 1997). Partial linking of large habitat patches can also occur through “stepping stones” of habitat which can facilitate movement of more mobile suites of species.

Where bushland remnants can be made larger, more compact and interconnected with wide corridors, and habitat stepping stones, the threats and adverse impacts facing biota will be somewhat ameliorated and buffered. Size and shape i.e. edge to area ratios of remnants are important to consider as the bushland edge experiences different environmental conditions from the interior of the remnant or corridor. Habitat degradation begins at edges in an urban landscape as these are more accessible to the pest plant and animal species that colonise from human residences and edges also receive greater inputs of water and nutrients due to runoff from built-up areas.

Larger, compact habitat areas will have more high quality interior habitat and will support larger biotic populations which are more self sustaining. It follows that these will be easier to efficiently manage than small fragmented areas. In larger, less isolated fragments there is more chance of species surviving events which would otherwise lead to local extinction such as climate change, fluctuating food supply, changes in birth and death rates, genetic processes, floods, wildfires or human-induced habitat changes (Bennett 1992). If an event causes local extinction or reduction of the population, complete or partial (stepping stone) connectivity of patches will allow replenishment and re-establishment of the species (Seidlich 1997). Connections between fragmented habitat can also allow for restoration of the heterogeneity and patchiness that was present in the landscape but which has been lost from small, isolated fragments (NPWS 1997). The establishment of corridors and the reduced isolation

of habitat patches is hence crucial to successful management of remnant urban bushland in the long-term.

2. How are corridors and connections best designed?

Connections within and across the landscape can be achieved in a number of ways. These include:

- Increasing the size of remnants so that they encompass more than one vegetation type
- Consolidating and enlarging existing remnants to reduce the edge to patch size ratio
- Creating narrow linear connections (corridors) between remnants and along natural topographic features such as creeks and rivers.

Narrow strips of habitat and small stepping stones will be predominantly edge habitat and although they may be used by some species will not be used by species which require the less disturbed conditions of the interior habitat (Knox *et al* 1994). As a result, there are frequent discussions of appropriate corridor widths and placement in the landscape to overcome some of the edge effects and encourage use by a greater diversity of organisms (Nature Conservation Council 1991).

In consideration of the design of corridors, the following is important:

- Linking of small fragments and enhancing the habitat complexity and understorey layer (Greening Australia 2001).
- A shrub layer, some herbs, logs and litter are important (Greening Australia 2001) to allow movements of canopy-dwelling, shrub-dwelling and ground-dwelling vertebrates and invertebrates.
- Linkages between patches should be designed after consideration of target species, keystone species, focal species or species high in the food chain. This can help identify corridor width requirements, structural, resource and floristic requirements.
- Understanding the functional connectivity of habitats will involve consideration of the behaviour of the target species, the distance it can move and its response to, and ability to be supported by the habitats through which it must move (Bennett 1992).
- Corridor width recommendations vary from 25 m to 500 m. Some target species may use corridors only a few trees wide, utilise stepping stones or may fly over open ground to reach quality remnants/patches.
- On-ground management and maintenance of corridors is essential if their value to biodiversity is to be maintained.

2.1 Corridor function to facilitate movement and ensure sustainability of species

For all types of animals, movement is fundamental to their survival. Common movements include daily foraging explorations, dispersal movements to allow interchange between adjacent populations, seasonal or nomadic movements

to reach spatially/temporally fluctuating food resources, and long distance migratory movements (Bennett 1992).

Optimum corridor widths to achieve functional connectivity (facilitate animal movement) are impossible to specify in general, because they will be species specific, time specific, habitat specific and landscape specific (Friend 1991). In an urban landscape the optimum widths will be greater than in environments where adjacent activities produce fewer disturbances.

At present, many habitat remnants are not large enough to ensure long-term survival of populations of different organisms. For example, in Sydney, NPWS (unpublished(a)) noted when a remnant size falls below 3-5 ha, there is a significant reduction in species diversity for birds, amphibians and to a slightly lesser extent, plants. Another study by Dr Freudenberger's examining birds in ACT woodland remnants, revealed that few species were to be found in patches smaller than 10 ha in area, which did not have at least a 20 per cent shrub layer and some herbs, logs and litter (Greening Australia 2001). Such research highlights the importance of linking small fragments and enhancing habitat complexity and the understorey layer. Complexity and vegetation layers are required to facilitate corridor movements by shrub dwelling and ground dwelling animals (e.g. small mammals, reptiles, frogs, butterflies and a large number of other invertebrates).

Animals often rely upon corridors because they have an obligate relationship with natural vegetation and cannot move through inhospitable urban environments. Those that are least able to survive in altered portions of the landscape will have trouble passing barriers (e.g. a break in the forest due to a road which introduces a bare road surface, altered roadside habitat and intimidating traffic). Small terrestrial mammals, lizards, ground-dwelling invertebrates and even sedentary, understorey-inhabiting birds will be isolated by roads. Bats, flying invertebrates and birds are likely to be less vulnerable to isolation effects (Bennett 1991a). Body size and mobility play a part in corridor use and ability to overcome barriers (Bennett 1991b). Small animals which do not regularly move long distances will use corridors less than large, mobile animals (e.g. kangaroos and wallabies). Such small animals, with small home ranges, may be able to maintain a resident population in the corridor and this would form a source of dispersing animals (Bennett 1991b).

Corridor design should be considered in light of the particular species that the corridor is to benefit (i.e. those known to be present in the remnants and that are of conservation priority) (Bennett 1991b). Understanding the functional connectivity of habitats will involve consideration of the behaviour of the species, the distance it can move and its response to, and ability to be supported by the habitats through which it must move (Bennett 1992).

If the remnant patches are to be managed for the maintenance of bird diversity, for some bird species, habitat stepping stones may be very beneficial. A continuous canopy and/or a dense understorey may be required only by shy

birds and forest-dependent birds. Such species may require broad strips of forest up to 500 m in width to successfully utilise a corridor, due to sensitivity to edge conditions. Unfortunately, such broad corridor widths cannot normally be realized within the urban landscape.

For riparian and river-flat forest, a protection zone of 50 m on either side of rivers such as the Georges River has been recommended (NPWS 1997; Benson & Howell 1993). Smaller drainage lines of the Cumberland Plain should have a 40 m protection zone along both sides (NPWS 1997). Briggs *et al* (1999) suggests that under no circumstances should corridors be less than 25 m wide, to prevent the proliferation of edge effects.

3. Opportunities for building connectivity in Liverpool

Liverpool LGA has urban, semi rural and rural landscapes. Each landscape type poses different challenges, when trying to build connectivity in the natural landscape. Within semi rural and rural landscape there are often more opportunities to build connectivity and corridors. In an urban landscape the opportunities to build corridors are often limited by:

- The high percentage of land in private ownership
- Insensitive and type of current land use
- Current zoning (which provides for future land use)
- The cost of purchasing land for conservation use

Because of the real difficulties in implementing a viable corridor network within Liverpool, for the reasons stated above, careful consideration must be given to the most effective and efficient way of building remnant viability and connectivity in Liverpool.

3.1 Regional connectivity

Connectivity needs to be considered at a regional scale as well as at the local or LGA scale. The State Government has been addressing the issue of building a regional green space corridor network across western Sydney. This is set out in Regional Environment Plan No. 31 - Regional Parklands. This Plan applies to a 5400-hectare site in Western Sydney, which runs right through Liverpool LGA. This area is a priority for revegetation and bush regeneration activities.

The Federal Government has also recognized the importance of building connectivity within the Sydney landscape and has funded the Green Web Sydney project which is trying to identify opportunities for corridors and connectivity across Sydney.

Both the Green Web project and the REP 31 Parkland system offer opportunities for Liverpool LGA to benefit from and link to a regional system of corridors and connections.

3.2 Local connectivity

In an effort to achieve greater connectivity and viability of remnant vegetation in Liverpool LGA, the priority has been given to:

- Utilising and building a riparian corridor and buffer system
- Consolidating and connecting highly significant remnants

The riparian corridor system will provide connectivity within catchments and will link many remnants in urban and semi urban areas where existing land use and zoning prohibits other means of creating links.

As discussed above, reducing area to edge ratios of remnants is extremely important, so is creating links between different vegetation types. By focusing on making connections between highly significant patches Council can also be confident that its actions are achieving the maximum conservation gain in the most efficient, cost effective and practical manner.

Map 5 Connectivity and Riparian Corridors in Part E of this strategy shows a riparian corridor system for Liverpool and the priority areas for building regional connectivity and consolidation of remnants. The detailed explanation of how the specific areas were selected is set out in the technical document *Vegetation Mapping Component -Technical Report* also contained in Part E of this strategy.

Management objectives have been developed for the areas mapped as Riparian Corridors and Regional Connectivity Areas in Map 5. These are included in Part C of this document.

4. Conclusion

The areas mapped as Riparian Corridors and Regional Connectivity in Map 5 should be included in the Liverpool LEP as part of the environmentally significant layer (ESL). The mapped area and management arrangement should be referred to when considering land-use changes, identifying areas to receive offset actions and when considering funding and community education and community action projects.



Habitat Offsets Policy Framework

Liverpool City Council Biodiversity Strategy

August 2003



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1. What is offsetting

Land use activities and in particular development that increases the intensity of land use, can lead to the reduction of habitat, and a range of negative environmental impacts. These impacts can be site specific and they can also contribute to local and regional environmental impacts. This is often referred to as cumulative impacts.

The mitigation of cumulative impacts of land-use decisions are often not adequately addressed within the current planning processes and there have until now been limited opportunities for Council to impose conditions that are aimed at reducing the cumulative impacts of site based development. Likewise the current planning process primarily focuses on reducing impacts rather than restoring or enhancing the regional environment.

In areas where there has been significant vegetation clearing resulting in a high level of vegetation being listed as endangered or critically endangered, such as western Sydney, there is an urgent need to find new planning mechanisms which will enable environmental restoration and enhancement. Especially as there is a continuing demand for development and increased land use intensity.

Offsetting provides a mechanism by which the negative impacts at one site can be offset by positive actions at another site within a region. Offsetting, if used strategically could lead not only to maintenance of environmental viability, but also an overall improvement in environmental viability across a region.

The Department of Land and Water Conservation, in the discussion paper *Offsets, Salinity and Native Vegetation (2001)*, defines offsetting as a way "to compensate for the negative impacts of that activity, by taking a separate action with positive impacts."

In 2002 the State Government released a concept paper for public consultation titled *Green offsets for sustainable development (EPA 2002)* that defined offsetting as "...a way of having both economic development and environmental protection. Development continues, but not at the expense of the environment."

Environmental offsetting has been used in the United States for some time, particularly in relation to ameliorating pollution generated by development. There are a number of different approaches being considered by the NSW Government and community organisation. It is however generally agreed that environmental offsetting has the potential to

- Facilitate some development, which may have negative impacts;
- Ameliorate negative environmental impacts of development at a regional and local level; and
- Provide for environmental enhancement and restoration.

This policy is concerned primarily with offsetting negative impacts on biodiversity, by providing and protecting habitat. Benefits of offsetting include the opportunity to balance the competing interests of development and conservation, consider impacts of development within a regional context as well as providing a consistent approach to land-use decisions.

It is important to note that the offsetting mechanism is not the only option available to deal with these competing demands. Protection and mitigation are preferred as a first course of action. Offsetting should only be undertaken where it is considered appropriate and these preferred options have been exhausted.

Other environmental benefits may be gained from offsetting such as improvements in air and water quality, salinity and public amenity, however these are not the primary objective of this policy.

The kinds of actions that could be taken to offset impacts need to be determined at a local level and need to contribute to the overall environmental objectives of an area. Actions which are commonly associated with habitat offsetting include:

- Revegetation: native vegetation is returned from a previously cleared area by planting or seeding
- Regeneration: management actions are used to encourage the growth of naturally occurring seeds and other plant material in a previously cleared area
- Restoration: the quality and extent of an area of native vegetation is improved through revegetation and/or regeneration, combined with improved management
- Enhancement: the quality of an area of native vegetation is improved through management actions
- Direct purchase of land for reservation (DLWC, 2001)

Environmental offsetting is only one tool which can be used to achieve environmental objectives. It will not in itself either control or manage environmental impacts. It is however a useful tool to be used in conjunction with other management and planning processes and initiatives.

2. Current policy and statutory position

There are three general approaches to habitat offsetting being considered by agencies and the community. These are:

1. Regional offset ratios, where offsets could be specified for each ecological community within a region.
2. Case-by-case evaluation using a formula, and
3. Monetary contributions to a pool of funds.

NSW Government has indicated that it intends to develop an environmental or green offsetting policy. The concept paper *Green offsets for sustainable development* (EPA 2002) was released by the State Government to prompt discussion on the development of a coordinated policy framework position. A number of trial schemes are underway. These however primarily focus on offsetting the impacts of pollution and / or improving water quality, rather than restoring or maintaining terrestrial habitat. It is unclear when the State Government will release its policy framework.

Despite the fact that there is no coordinated policy framework for offsetting in NSW, the principles are being applied in a number of areas to achieve environmental enhancement and to reduce impacts at a regional level.

NSW Fisheries uses a combination of a set offset ratio and a monetary contribution in working out appropriate offsets to compensate for the loss of seagrass habitat. NSW Fisheries' policy, *Aquatic Habitat Management and Fish Conservation* (section 1.2), "requires habitat compensation as a condition of consent for many developments to maintain a 'no net loss' habitat policy." This policy requires that a monetary bond or payment be lodged with NSW Fisheries prior to any works being undertaken which may adversely impact on certain aquatic habitat types. In recognition of a number of environmental factors, such as the time needed to establish viable new habitat, and other environmental impact, compensatory habitat is calculated on a 2:1 basis.

NPWS has applied a case by case approach in determining offset for loss of habitat for threatened species. NPWS has applied the principle of offsetting in granting concurrence to large infrastructure projects. In granting concurrence to the development of the Karuah Bypass to the RTA, a compensatory habitat package was negotiated on a 4:1 basis. (Per Com G. White 11/02/03)

The test of significance of impact to threatened species, populations, ecological communities or their habitats ('8-part test') is an important part of the Development Application and approval process. In making a decision on significance of impact Council can consider the findings of the Liverpool Biodiversity Strategy and any other information relevant to the question. This should include the validated conservation significance of the land in a regional and local context as well as the regional and local targets for each individual vegetation community.

It is noted that the EP&A Act and TSC Act have provisions relating to cumulative impacts that need to be addressed and it is suggested that offsetting may minimise some cumulative impacts.

Offsetting is also being considered in a number of Native Vegetation Management Plans currently being developed under the Native Vegetation Conservation Act.

At this time there is no legal framework which allows for monetary contributions to a pool of funds. This has been considered in relationship to some developments and

has occurred in a few limited cases, however current legal interpretations the EPA Act does not allow for funds to be paid into a general fund or trust to be used for works not directly related to the development.

Section 94 of the EP&A Act could possibly be used to facilitate financial contributions as an offset mechanism, as well as the dedication of land, however at this time PlanningNSW consider that the protection of biodiversity or conservation of land is not covered by the current definition of providing public amenity or public service. This may change in the future and if so this section of the Act may provide an addition mechanism to achieve financial offsetting.

In both the NPWS and NSW Fisheries examples the compensatory habitat was made a condition of consent or a condition of a permit issued under the EPA Act and in the case of NSW Fisheries also the Fisheries Management Act. So although there is currently no specific legislative basis for offsetting, the current legislation does provide some opportunities for applying conditions for compensatory habitat provisions.

The current legislative framework does however limit the possible scope and scale of offsetting, and legislative changes may be necessary to enable implementation of a broader and more comprehensive offsetting regime. In particular the current legislation does not provide a simple way for financial contributions to offsetting rather than management or operational contributions. Therefore it is not possible to establish an Offset Fund or 'conservation bank' at this time (Sheahan 2001).

The NPWS is currently preparing a recovery plan for the endangered ecological communities of the Cumberland Plain. This document is likely to establish recovery and conservation targets for each of the listed communities. It is also likely to recommend offsetting as a mechanism to achieve recovery of ecological communities in western Sydney.

3. Objectives and principles

The objective for a habitat offsetting policy for Liverpool is to provide a key mechanism to assist in and contribute to meeting the objectives of the Liverpool Biodiversity Strategy. A habitat offsetting policy for Liverpool City Council should aim to:

- Facilitate some development, which may have negative impacts;
- Ameliorate negative environmental impacts of development at a regional and local level; and
- Provide for environmental enhancement and restoration.

The use of offsets as a means of compensating for any impacts as a result of clearing native vegetation should be applied only after principles of prevention and mitigation have been applied. This means that all measures available to council that would allow for the protection of native vegetation and offer an alternative to clearing have been exhausted. This not only includes legislative requirements under the various Acts, but also includes any policy, strategy, negotiation or alternatives available.

Offsetting should only be considered once all efforts to avoid, minimise and mitigate any negative impacts have been exhausted.

The principles that should be adopted by Liverpool Council to underpin the habitat offsetting policy are:

- The primary objective of an offset activity should be to create, enhance, or maintain ecologically viable habitat for locally endemic species
- A habitat offset policy should lead to a net gain and improve the condition of the environment
- An activity (especially clearing) should only proceed when the offset receiving site is making acceptable progress towards the predicted ecological state, and management arrangements are legally secure
- An offset agreement should not lead to permanent environmental impacts, due to the delay before offset actions yield environmental benefits
- Offsetting should only be considered once all efforts to avoid, minimise and mitigate any negative impacts have been exhausted. The receiving offset site must be ecologically suitable and appropriate, for either protection, management or restoration
- Management and monitoring of offset activities should be undertaken over an ecologically meaningful timeframe (10 years plus)
- Offsetting should not be used as a justification for granting approval to developments, where the cumulative environmental impacts of that development are greater than the benefit to be obtained from the offset action.
- Offset receiving sites should be identified and selected in accordance with the conservation priorities and vegetation targets set out in the Liverpool Biodiversity Strategy

3.1 When is it appropriate to apply habitat offsetting?

As outlined above the policy should be applied to land covered by the Environmentally Significant Lands Layer (ESL) in the Liverpool Local Environment Plan. Within this broad area a number of other factors should be taken into consideration.

Offset actions should only be used where there are good prospects that the offset action will lead to an improvement in environmental values. Where an offset action is not feasible or there is a high risk that it may fail, offsets should not be considered.

Offsets are not necessarily appropriate for addressing all the impacts of clearing on all environmental values. And at time the impact of clearing may be considered too great to be able to be satisfactorily compensated for by minimisation, mitigation and offsetting actions. In these cases clearing should not be allowed to occur.

4. Habitat Offset Policy for Liverpool Council

Habitat offsetting offers a number of opportunities to enable Liverpool Council to meet many of the objectives of the Liverpool Biodiversity Strategy. At this time however there are also a number of constraints on what can be achieved through offsetting. This is in part due to the limitations imposed by the current legislative framework, and the lack of a coordinated regional or State-wide policy framework. Set out below is a summary of some of the opportunities and constraints applying to the adoption of a habitat offsetting policy in Liverpool.

4.1 Opportunities

An offsets policy could offer the following opportunities:

- Provide flexibility for land managers and decision makers
- Provide greater opportunities for regional development
- More easily manage the impacts of land clearing in the region
- Contribute to reaching Council's target for native vegetation
- Potentially diversify land-use by providing an incentive for vegetation management
- Provide a more effective framework for remediation measures
- Better enable the true cost of the cumulative impact of development to be accounted for and where appropriate recovery
- Provide a standardized and transparent approach
- May be considered by NPWS in determining the significance of impacts on Endangered Ecological Communities

4.2 Limitations

The limitations or constraints on the effectiveness of an offset policy could include:

- The lack of regional or state-wide framework or policy position
- Lack of data on the ecological values of the region
- Limitations set by the current legislation
- Administration costs to manage and monitor receiving lands
- Additional cost to developers
- Potentially complex negotiation process
- Potential lack of landowners willing to participate in receiving offset actions
- Time required for benefits to be evident before development can proceed.

4.3 Policy and Planning Framework

The most appropriate offsetting framework for Liverpool Council is based on establishing a system of loss to benefit action ratios across the LGA. A case-by-case based system is not considered appropriate as it is open to inconsistent application, may not be seen to be transparent and is also likely to be more resource intensive, as negotiations would need to occur for each case.

At this time there is not an appropriate legal framework to enable the development and administration of monetary offsetting. The policy set out below is therefore designed to provide a regional system of appropriate offset ratios.

The following framework for development of a Habitat Offsets Policy (HOP) is recommended for Council.

The framework is aimed at creating a policy for habitat offsetting that will:

- Provide for ecologically sustainable development
- Increase level of security for lands with conservation values within Liverpool
- Increase the viability of habitat through management and regeneration
- Increase the area of habitat through restoration and enhancement

4.4 Relevant Planning Instruments

The primary instruments for giving effect to the Habitats Offset Policy should be the Local Environment Plan (LEP). Within the special provision of the LEP a clause needs to be added to state that the Habitat Offsets Policy is to be applied to lands identified in the Ecologically Significant Lands (ESL) Layer of the LEP.

The LEP will give legal weight to the policy and put it into a broader planning context. This will ensure consistency of policy, transparency of decision making, and should reduce duplication and administrative costs for both Council and developers. It will also ensure that the objectives and requirements of the policy are addressed early in the planning and development application process.

The policy can be spelt out in full in a revised version of the Natural Assets Development Control Plan. However a DCP alone, may not be sufficient to ensure proper recognition of the policy unless it is backed up by a clear reference in the LEP. In the long run when Council develops a new LEP in line with the PlanFirst model, the policy would be fully integrated into the LEP.

The HOP could be applied to all new developments being proposed on land that is:

- identified as of high conservation significance (Region Core, Local Core, Support for Core, Urban Remnant) in the LCC Biodiversity Strategy; and /or
- covered by the Environmental Significance Layer (ESL) of the LEP
- an endangered ecological community

The LEP would require an applicant wishing to receive development consent on the land listed above from Council to prepare an Offset Plan to accompany their development application. If Council considers that:

- all actions to avoid, mitigate and minimise impacts have been undertaken and considered;
- all requirements of the Threatened Species Conservation Act have been complied with; and
- the Offset Plan complies with the Habitat Offsets Policy;

Council may grant 'deferred commencement' consent. In granting this Council will distinguish the works and agreements within the Offsetting Plan as the conditions that must be satisfied before the consent can operate.

Provision should be made in the LEP requiring the concurrence of the NPWS in respect of the approval of any development application in which offsetting is proposed. Note: The NPWS concurrence requirements need only persist until an accepted practice emerges.

This policy should aim to be consistent with the Cumberland Plain Ecological Communities Recovery Plan, which is currently being drafted by NPWS.

Note that it is a high priority recommendation of the LCC Biodiversity Strategy that the ESL layer of the LEP be updated to reflect the conservation significance mapping included in the LCC Biodiversity Strategy.

4.5 Where to apply offsetting benefits (receiving sites)

Habitat offsetting receiving sites can be either within a specific development site, adjacent to that site or anywhere within Liverpool Council area where a relationship or nexus, between the receiving site and the development (and its impacts) can be established.

This is the case because Section 80A(f) of the EPA Act enables conditions to be imposed when granting consent, that "requires the carrying out of works (whether or not being works on land to which the application relates) relating to any matter referred to in section 79C (1) applicable to the development the subject of the consent."

In deciding the question of fairly and reasonably relating to the development the Liverpool Biodiversity Strategy provides a series of targets, performance objectives and measures for the vegetation communities found in the LGA. This is set in the context of a number of state policies and targets for the protection and recovery of these vegetation communities. These state policies and targets, as well as the provisions adopted in the Liverpool Biodiversity Strategy need to be considered when deciding if the development impacts, either singularly or cumulatively, affect the capacity to meet these targets.

For the offset to 'fairly and reasonably relate to the development' (clearing) then the recipient land must occur within the Liverpool LGA, and be of the same ecological community. Offset actions should be developed so as to ensure that they contribute to achieving the vegetation targets adopted by Council.

In relation to developments/activities that fall under Part 5 of the EP&A Act, such as Council infrastructure projects, Council should ensure that this policy is met.

4.6 What offset action is appropriate for the different classes of significant vegetation.

The following table shows which kind of offset actions can be applied to offset the impacts of a proposal on the various conservation significance classes. See Part E Map 4 and Part C Conservation Classification for a description of each conservation significance class.

Table 1 – Appropriate actions to offset for impacts on land of each conservation significance class

Offset Act	Regional Core	Local Core	Support Core	for	Corridor Area
Protection	Yes	Only if ABC and adjacent an existing protected area	NO		NO
Enhancement (with protection)	Only types TX, TXR	Yes	Yes		Yes
Creation (with protection)	No	No	No		Yes

It should be noted that consent to clear Regional Core should only be given when there is an overwhelming socio-economic benefit of State significance, where the impact is unavoidable.

Conditions must apply to how and where offset actions are applied. Below are examples of rules that may be appropriate for each of the three offset actions proposed in this policy.

4.7 Offset Action - Protection

There is a range of legal mechanisms which provide for varying levels of conservation security. The objective of the offsets policy is to gradually move land along the spectrum of conservation security, increasing the level of security for receiving sites to ensure the enough land is managed permanently and effectively for its habitat values, to meet the vegetation management targets in the LCC Biodiversity Strategy and the objective of the Cumberland Plain Recovery Plan, when its is adopted.

If development approval is given to clear one area then the offsets policy would enable/require the developer to offset this loss by increasing the conservation security of another site. To ensure that this does not lead to a net loss of habitat the area to be secured should be larger than the area to be cleared.

The overall aim is to contribute to the number of hectares in the most secure tenure for conservation. For protection the appropriate level of security achieved must be dedication / donation of land to either State or to Council for ownership, or provide a mechanism that binds future owners of the land to manage the land for conservation and for its habitat values.

Table 2 – Mechanisms for achieving conservation security appropriate for use in Protection offset actions

Protection mechanism	Accepted level of protection
• Reservation under National Parks and Wildlife Act	Yes
• Council Reserve	Yes
• Voluntary Conservation Agreement (VCA) (NPW Act) with management	Yes

• Rezoning within LEP to a specially developed conservation zone	Yes
• Positive Covenants (Section 88E Conveyancing Act) with a legally binding management plan	No
• Property Agreement (NVC Act)	
• Rezoning within the LEP to 7(a) or 7(b) zone	

Offset actions to achieve increased protection either on or off site can include:

- Donation of land to the crown for dedication as a conservation reserve
- Transfer to care, control and management by Council, with implementation of a conservation management plan
- Protection of own land or a third parties land via application of a covenant or voluntary conservation agreement under the NPW Act.

The application of offsetting for protection must be done in accordance with the principles outlined above and the following:

- The minimum area receiving protection is to be provided must at least be equal to that indicated in Table 4 – Habitat Multiplier Table
- If the area is less than 5 ha it must be adjacent to a protected area
- The area receiving the protection can not be in public ownership or on land that is already secured for conservation
- The area must be within the ESL layer
- The area receiving protection must be identified as either Regional Core or Local Core and be of A, B or C condition in the Liverpool Biodiversity Strategy conservation significance maps (If areas are TX or TXR they must receive enhancement actions as well as protection)
- The area should be (wherever possible) of the same ecological community (unless other conservation priorities set out in a recovery plan take precedence)
- Must provide evidence of the owners consent to receiving the offset protection action with the development application
- Must provide legally binding documentation and evidence of the offsetting protection arrangement, prior to commencement of development works / activity.
- Must be supported with resources to develop and implement a plan of management

4.8 Offset Action - Enhancing habitat viability

In addition to increasing the conservation security of habitat, it is important to increase the viability of habitat that has become degraded. Ensuring the health and integrity of the habitat secured for conservation is a vital part of ensuring that protecting land is a successful mechanism for protecting and enhancing biodiversity. Therefore the HOP also provides for and requires that receiving sites are managed to improve their integrity and viability over time. This could include undertaking restoration, regeneration and threat prevention and minimisation works.

Once habitat enhancement work has been undertaken it is of course important to ensure that that the benefits of that work will be durable over time, as the loss for which they are compensating will be lasting. It is therefore imperative that all areas

for which enhancement offset works are undertaken must receive a level of protection and ongoing management to ensure that the ecological benefit obtained by them is maintained into the future.

Bush regeneration, threat abatements and minimisation actions (such as fencing), and restoration works can all contribute to habitat enhancement. The appropriate action for each site should be determined in an ecologically sound habitat restoration plan which would need to be submitted with the development application.

A number of suitable mechanisms exist to ensure that habitat regeneration and management actions are planned, appropriate, enforced, managed over time and that an appropriate level of conservation security applies to the benefits received from the action/s undertaken. These include:

- Property Agreement (NVC Act)
- Conservation Agreement (NVC Act)
- Management agreement as a condition of consent
- Plan of Management

The application of offsetting actions for increasing quality and viability must be done in accordance with the principles outlined above and the following:

- The minimum area for which improvement work are to be undertaken must at least be equal to that indicated in Table 4 – Habitat Multiplier Table.
- The area receiving the works can either be public or private land
- The area must be within the ESL layer
- The area must be identified as either Regional Core (TX &TXR), Local Core (ABC, TX, TXR) or Support for Core identified in the Liverpool Biodiversity Strategy
- The area should be (wherever possible) of the same ecological community as the area being cleared (unless other conservation priorities identified in a recovery plan take precedence)
- An ecologically appropriate and viable Restoration Plan for the receiving site must be provided with the Development Application.
- Must provide documentation and evidence that the offsetting actions undertaken (implementation of the Restoration Plan) has been progressed to an agreed level prior to commencement of works approved with consent
- A legally binding management agreement which contains performance measures for the site and works must be entered into prior to commencement of works approved with consent
- Must provide evidence of the owners consent to receiving the offset protection action with the development application
- Works and future management must be secured with a bond, which will be held in trust by Council.
- A fee will be payable to cover Council's costs to undertaking inspections of the site and evaluation of the performance measures in the management agreement.

A number of suitable mechanisms exist to ensure that habitat enhancement actions are planned, appropriate, enforced, managed over time and secured. These include:

- Property Agreement (NVC Act)
- Voluntary Conservation Agreement (NPW Act)
- Management agreement as a consent conditions
- Plan of Management
- Positive Covenants (Section 88E Conveyancing Act)
- Rezoning within the LEP to 7(a) or 7(b)

4.9 Offset Action - Creating habitat

A major objective of the Liverpool Biodiversity Strategy is to not only halt the rate of loss of habitat within Liverpool, but to increase the area of some ecological communities. The HOP will provide opportunities for developers to undertake works to create new habitat in areas that are adjacent to existing habitat or in area where there is a sound ecological reason to do so (eg. build a corridor network or create stream buffers). This is vital if the objective of 'recovery' is to be achieved for endangered ecological communities. Any habitat creation works would have to be planned, appropriate, enforced and managed over time.

Ecologically appropriate actions for habitat creation will depend on the individual features of the site and the type of ecological community being created. Actions which could be included in a Habitat Creation Plan or Landscaping Plan could include:

- Planting
- Threat abatement and minimisation activities
- Regeneration and restoration

Once habitat creation work has been undertaken it is of course important to ensure that the benefits of that work will be durable over time, as the loss for which they are compensating will be lasting. Therefore all areas for which habitat creation offset works are undertaken must receive a level of protection and ongoing management to ensure that the ecological benefit obtained by them is maintained into the future.

The application of offsetting actions for increasing quality and viability must be done in accordance with the principles outlined above and the following:

- The minimum area for which improvement work are to be undertaken must at least be equal to that indicated in Table 4 – Habitat Multiplier Table.
- The area receiving the works can be either public or private land
- The area must be identified within the in the Biodiversity Strategy Part E maps, as either a riparian corridor or a regional connectivity area.
- The area should be (wherever possible) of the same ecological community as the area being cleared (unless other conservation priorities identified in a recovery plan take precedence)
- An ecologically appropriate and viable Habitat Creation or Landscaping Plan for the receiving site must be provided with the Development Application.
- Must provide documentation and evidence that the offsetting actions undertaken (implementation of the Plan) has been progressed to an agreed level set (performance measure) prior to commencement of works approved with consent

- Must provide evidence of the owners consent to receiving the offset protection action with the development application
- A legally binding management agreement which contains performance measures for the site and works must be entered into prior to commencement of works approved with consent
- Works and future management must be secured with a bond, which will be held in trust by Council.
- A fee will be payable to cover Council's costs of undertaking inspections of the site and evaluation of the performance measures in the management agreement.

A number of suitable mechanisms exist to ensure that habitat regeneration and management actions are planned, appropriate, enforced, managed over time and secured. These include:

- Property Agreement (NVC Act)
- Voluntary Conservation Agreement (NPW Act)
- Management agreement as a consent condition
- Plan of Management
- Positive Covenants (Section 88E Conveyance Act)
- Rezoning within the LEP to 7(a) or 7(b)

5. Offset Multiplier Formula

A one for one offset is not considered suitable as it does not take account of a number of ecological factors. A multiplier is required to take account of the following factors.

- the area of clearing;
- the negative impact per hectare of the clearing (expressed as a set of environmental values lost);
- the area of the offset action;
- the positive impact per hectare of the offset action (expressed as a set of environmental values gained);
- the risk of the offset action failing;
- the 'net gain' required for environmental improvement; and
- the adjustment for time lag before the positive impact is achieved

It is important to note that the conservation multiplier can only be represented as a relative value. It is not possible to allocate an exact value as it is not possible to quantify or determine the real value and function of vegetation and ecosystems being lost. The relative values selected in this policy to represent conservation values, have been selected so as to ensure that the policy is workable, and able to meet its objectives.

The relative values set out below have been selected so that:

- The offset actions are achievable in the landscape. That is, that there is enough available land to which offset actions can be applied;
- Applying the offset actions is not cost prohibitive, or places a burden on developers which is unreasonable;
- The offset actions are large enough to enable vegetation retention and restoration targets set out in the Biodiversity Strategy to be met; and
- Are high enough to accommodate the inherent risks in the process.

The formula used to calculate the numbers in the Liverpool Multiplier Table is:

Offset required = Area Cleared x Compensation multiplier

The 'Compensation Multiplier' is based on three factors.

1. A value to represent the ecological value or contribution made by the area being lost. This is based on the conservation significance rating that the area has been given in the conservation assessment process undertaken for the Liverpool Biodiversity Strategy. A relative value has been given to each conservation class.
2. A value to represent the relative risk of the action not working and therefore the benefit not being achieved. Enhancement and creation works have a much higher risk of not being successful than simply protecting existing high quality areas.
3. A value to represent the relative time delay until the action provides the appropriate ecological benefit.

Another way of putting it is:

$$\text{Offset required} = \text{Area Cleared} \times (\text{Conservation Value} \times \text{Time/Risk Factor})$$

Each conservation significance classification (as identified in the maps in section E), has been given a value which represents its relative conservation value. These are set out in the table below.

Conservation Classification	Conservation Value
Core Region	4
Core Local	3
Support for Core	2
Urban Remnant	2
Other native	1

The numbers used for the time/risk component of formula has been chosen to represent the relative risk in the offset action failing and the relative time until the desired ecological benefit is achieved. The three offset actions were ranked as having either high, medium or low risk or time lag. A number was then allocated to represent these rankings as set out in Table 3. .

Table 3 – Time Risk Ranking

Factor	Protect	Enhance	Create
Time/Risk	Low	Medium	High
Time/Risk	0.5	2	4

The following multiplier table (Table 4) should be used to calculate the appropriate size/quantity of an offset action to be supplied to receiving land, based on the conservation classification of the area being impacted (eg.cleared) by an activity.

Table 4 – Habitat Protection Multiplier Table.

Conservation classification of land being impacted on by the activity	Offset action to be applied to the receiving land		
	Protect	Enhance	Create
Core Region	2	8	NA
Core Local	1.5	6	NA
Support for Core	1	4	8
Urban Remnant	NA	NA	NA
Other	NA	2	4

5.1 Bonds and management fee

A bond for both habitat enhancement and habitat creation work will be required. This is to ensure that offset action works are begun, completed to the standard required, and receive ongoing management. To ensure that works are undertaken the bond must be set high enough to create an incentive for the developer to comply with the agreed plan.

The bond for will be calculated using the following formula:

Bond = (Cost of undertaking action X 2) + Management Fee

The management fee is to cover the cost of Council undertaking site inspections and auditing for compliance with the Habitat Creation, Regeneration and Landscaping Plans. The management fee will also need to cover the annual costs required to maintain the works to the standard required. The bonds will be paid into a Trust account overseen by Council.

The a pre determined percentage of the bond will be returned to the developer when particular performance measures in the Habitat Enhancement or Creation Plan have been met.



Statutory Planning Framework

Liverpool City Council Biodiversity Strategy

August 2003



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Executive Summary

This report aims to provide background information for the Liverpool City Council Biodiversity Strategy by describing the various policies, strategies, plans and legislation supporting, and guiding the generic principles of ecologically sustainable development (ESD) and, in particular, protection and management of biological diversity and ecological integrity. International, commonwealth, regional and local legal instruments are listed and briefly explained.

International and Commonwealth Framework

The international and national instruments that deal with biodiversity, relevant to Council's activities include:

- Japan–Australia Migratory Bird Agreement (JAMBA) and China–Australia Migratory Bird Agreement (CAMBA)
- International Convention on Biological Diversity
- International Declaration on Environment and Development and Agenda 21
- Intergovernmental Agreement on the Environment (IGAE)
- The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- National Strategy for the Conservation of Australia's Biological Diversity
- National Local Government Biodiversity Strategy

State Framework

The state instruments that deal with the management and conservation of biodiversity relevant to Council's activities include:

- NSW Biodiversity Strategy
- Threatened Species Conservation Act, 1995 (TSC Act)
- Local Government Act, 1993
- Local Government Amendment (Ecological Sustainable Development) Act 1997.
- Environmental Planning and Assessment Act, 1979 (EP&A Act)
- Catchment Management Act, 1989 (CM Act)
- Native Vegetation Conservation Act, 1997
- Nature Conservation Trust Act, 2001 (NCT Act)
- The NSW Fisheries Management Act, 1994
- Rivers and Foreshores Improvement Act, 1948 (RFI Act)
- Protection of the Environment Operations Act, 1997 (POEO Act)
- Conveyancing Act, 1919
- State Environmental Planning Policy No. 44, Koala Habitat Protection
- State Environmental Planning Policy No. 19: Bushland in Urban Areas
- Water Management Act, 2001 (WM Act)

Regional Framework

The relevant regional plans and policies that deal with the management and conservation of biodiversity include:

- Sydney Draft Regional Environmental Plan No. 31 – Regional Parklands
- Georges River Catchment Regional Environmental Plan No. 2
- Fish Habitat Protection Plans
- Catchment Blueprints
- Cumberland Plain EEC Recovery Plan Working Paper (NPWS, unpublished(a))
- Public land plans of management
- Stormwater Management Plans

Local Framework

Local planning and policy guidelines include:

- Liverpool City Council (LCC) Local Environmental Plan (LEP)
- LCC DCP No.8 – Natural assets
- Various area based DCPs
- LCC DCP No. 32 – Exempt Development
- LCC DCP No.33 – Complying Development
- Development based DCPs such as Telecommunications Facilities, Industrial Development etc

Statutory Planning Framework

There is an abundance of upper level policies, strategies, conventions, agreements and plans supporting and providing guidance on the generic principles of ecologically sustainable development (ESD) and, in particular, the protection and management of biological diversity and ecological integrity. The integration of information on biodiversity and conservation values into regional planning instruments is gradually taking place and will result in a flow on to local planning instruments.

1.1 International and Commonwealth Framework

The international and national instruments of biodiversity relevant to Liverpool City Council (LCC) are:

- *Japan–Australia Migratory Bird Agreement (JAMBA) and China–Australia Migratory Bird Agreement (CAMBA)*. A number of species occurring in Liverpool are covered under these international treaties. Any species identified on these lists are considered to be a matter of 'national environmental significance' under the Commonwealth *Environment Protection and Biodiversity Conservation Act*.
- *International Convention on Biological Diversity*. Provides a foundation for the conservation and sustainable use of biological resources by requiring the participating countries to develop and implement biodiversity strategies. A number of national and state strategies have flowed out of Australia's commitment to this convention.
- *National Strategy for the Conservation of Australia's Biological Diversity*. Provides a framework for the conservation of biodiversity and for implementing the principles of ESD by identifying broad objectives and actions. It recognises the local government role in biodiversity conservation across a range of actions.
- *International Declaration on Environment and Development and Agenda 21*. Commits Australia and other signatories to principles and process of ESD and highlights the role of local government.
- *Intergovernmental Agreement on the Environment (IGAE)*. The IGAE identified the various roles and sought co-operation between the different levels of government in conservation and management of biological diversity. It highlights the important role and responsibility of local government in developing and implementing appropriate environmental policies
- *National Local Government Biodiversity Strategy*. Suggests broad principles and directions for the management of biodiversity and recognises local governments expanding role. Recognises the need for consistency with the state and Commonwealth policies and strategies. It identifies and addresses a number of what are considered to be 'major impediments', to Council biodiversity planning and management.
- A number of other national strategies and policies are relevant to the management and conservation of biodiversity such as the Commonwealth

Wetlands Policy, National Water Quality Management Strategy, and the National Weeds Strategy.

- *Commonwealth Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act).* The EPBC Act provides a national scheme for environmental protection and biodiversity conservation. It incorporates referral mechanisms and environmental impact assessment processes for projects of national significance. Triggers for referral to the Commonwealth include matters of National Environmental Significance (NES) such as endangered ecological communities (EECs) and endangered species, JAMBA/CAMBA species, Ramsar sites and World Heritage Areas.

1.2 State Framework

The state instruments for the management and conservation of biodiversity include:

- *Threatened Species Conservation Act, 1995.* Obligations on Councils include consideration of threatened species, populations, ecological communities and recovery plans in fulfilling their statutory responsibilities in the development approvals process under the EP&A Act. The Act inserts provisions to the approvals process where there is likely to be 'significant affect'. A Recovery Plan may also bind Council to certain actions or activities on Council owned land. The Recovery Plans seek to involve land managers such as Council to co-operatively protect, manage and promote the recovery of the threatened species, population or ecological community. The TSC Act also provides for the listing of key threatening processes and critical habitat and the preparation of threat abatement plans.

A number of threatened species, endangered ecological communities and populations that occur in Liverpool are listed under this Act (refer to 'Ecological Setting' resource document attached to the Liverpool Biodiversity Strategy)

- *Local Government Act, 1993.* Under the Act plans of management must be prepared for 'community land'. The plans should address a variety of factors including biodiversity conservation and management. Council must adopt a specific plan of management for community land affected by a recovery plan, threat abatement plan or containing critical habitat under the TSC Act. Council must also prepare a State of the Environment Report under this Act. The Act has a range of other provisions that allows for appropriate management of operational land and infrastructure, providing educational services, setting rates and charges and issuing orders. It also has a range of enforcement powers.
- *Local Government Amendment (Ecological Sustainable Development) Act 1997.* This Act amends the *Local Government Act, 1995* to include sustainable development. When Council is determining a development application, it must "give regard to" the principles of ecologically sustainable development. However, Council is not bound to place more weight on environmental rather than non-environmental considerations (Cripps, Binning and Young, 1999).
- *Environmental Planning and Assessment Act, 1979.* The EP&A Act is the principal planning legislation in NSW and is administered by PlanningNSW. It

provides a framework for overall environmental planning (Part 3 of the Act) as well as assessment of the environmental impact of development proposals (Part 4) or activities (Part 5).

Part 3 of the EP&A Act has provisions for the preparation of environmental planning instruments such as local environment plans (LEPs), regional environmental plans (REPs) and state environmental planning policies (SEPPs). The Act provides for the protection or conservation of native flora and fauna within these environmental planning instruments.

Part 4 of the EP&A Act addresses environmental impact with a supporting Statement of Environmental Effects (SEE) or Environmental Impact Statement (EIS). Part 5 of the EP&A Act applies where development consent is not required and may include activities on Council owned land. A Review of Environmental Factors (REF) is the established methodology for undertaking an assessment under Part 5. These documents are prepared by the applicant/proponent.

The decision making process for the assessment of a development/activity occurs on a case by case basis and is usually guided by the relevant planning instrument/s. The EP&A Act places a duty on the consent/determining authority to adequately address a range of environmental matters including maintenance of biodiversity and the likely impact to threatened species, populations or ecological communities (under the TSC Act – refer above).

- *Catchment Management Act, 1989.* Total Catchment Management (TCM) under the CM Act is aimed at achieving co-ordinated and sustainable management of natural resources on a water catchment basis. A network of Catchment Management Boards and Trusts aims to co-ordinate the identification of degraded lands, programs for rehabilitation and community awareness and to promote stable and productive environmental conditions. Management plans may be prepared that should incorporate considerations relating to the protection and management of biodiversity.

The Boards have recently prepared draft 'Catchment Blueprints' that aim to focus and prioritise community and government initiatives and investment – such as grant funding. In addition, it is understood that they will be developed to assist in the implementation of key aspects of the *Native Vegetation Conservation Act 1997* and *Water Management Act 2001* (refer below).

- *Native Vegetation Conservation Act, 1997.* Provides for native vegetation management and protection of conservation values through the preparation of Regional Vegetation Management Plans, Property Plans and agreements. Liverpool LGA is partially excluded from this Act as listed in Schedule 1.
- *Nature Conservation Trust Act, 2001.* The aims of this Act are to encourage landholders to enter into co-operative arrangements for the management and protection of lands that support significant natural heritage value, to provide mechanisms to achieve this and to promote knowledge,

appreciation and understanding of natural heritage and the importance of conserving that heritage.

- *Water Management Act, 2001*. Repeals a range of legislation and is staged in its introduction. The aims of the act include to “protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality”. This is done through the inclusion of provisions for the development of water management plans and controlled activity approvals.

The State Water Management Outcomes Plan provides the framework for the water management plans and sets out the overarching policy context, targets and strategic outcomes. The Act also provides a statutory basis for the set up of committees, plan development and public exhibition. It may identify zones where development should be controlled, specifies provisions that authorities are subject to when taking action, development that required Ministerial concurrence and establishment of action plans.

This Act will require approval for any works within or adjacent to a river. It will not exempt Councils from then need to have a permit for the works as previously was the case for the *Rivers and Foreshores Improvement Act, 1948*. A range of conditions can be provided on the permit. Exempt development can be identified in the Act and the implementation of the approval process can be guided by the water management plans for the area.

- The *NSW Fisheries Management Act 1994*. The Act provides for the protection, conservation and recovery of threatened species. It also makes provision for the management of threats to threatened species, populations and ecological communities, as well as the protection of fish and fish habitat in general. A list of aquatic threatened species, populations and ecological communities is available on the NSW Fisheries website. Community input into management strategies for threatened species conservation is a cornerstone of the legislation.

A number of activities require consultation and approval from NSW Fisheries under the Act. These include:

- Any dredging or reclamation in any waters (permanent or intermittent, man-made or natural, public or private). This will require a permit from a public authority (other than a local government authority). If Council conducts the works itself, a Part 7 permit will be required. The definition for dredging or reclamation under the Act is quite broad and may include stormwater control devices, waterway crossings, retaining walls, rock-lining, realignment, piping or channelising of waterways.
- Any potential harm to marine vegetation including seagrasses, macroalgae and mangroves. This will require a Part 7 permit.
- Any blockage to fish passage (temporary or permanent). This will require a Part 7 permit.
- Removal or movement of snags, in-stream vegetation or boulders. This may require consultation with NSW Fisheries.

- Any development in an Intertidal Protected Area, in an Aquatic Reserve, or development requiring an REF or EIS on land in the locality of an Aquatic Reserve. This will require consultation with NSW Fisheries.
- *Rivers and Foreshores Improvement Act, 1948*. Provides effective controls on activities that could harm sensitive waterway environments. The Act has provisions that require a permit for excavations, fill and other works in or near rivers, estuaries and lakes as it is recognised that they can have significant detrimental environmental impacts on habitat, water quality, flooding and erosion. This Act has been repealed by the *Water Management Act, 2001*.
- *Protection of the Environment Operations Act 1997*. The POEO Act allows for explicit environmental protection policies to be drafted and encourages more innovative approaches to the reduction of pollution.
- *Conveyancing Act, 1919*. Division 4 of this Act provides opportunities for promoting biodiversity conservation through the use of covenants which can impose certain actions related to conservation on the property title.
- *NSW Biodiversity Strategy*. The strategy recognises the collaborative responsibility of the community, local and state government and the importance of local planning in biodiversity conservation. Provides guidance for Councils to prepare and implement biodiversity plans (states that Councils need to implement biodiversity action plans by 2001).
- *Native Vegetation Conservation Strategy for NSW*. The strategy has been developed by the Native Vegetation Advisory Council (NVAC). It makes suggestions about the vision, outcomes, options for action and targets for native vegetation conservation and management in NSW and outlines options for future developments in this area. The strategy was setup to encourage feedback from a wide range of groups and individuals interested in native vegetation.
- *State Environmental Planning Policy No. 44, Koala Habitat Protection*. This SEPP encourages the conservation and management of natural vegetation areas that provide habitat for koalas and that will ensure permanent free-living populations will be maintained over their present range.
- *State Environmental Planning Policy No. 19: Bushland in Urban Areas*. Protects and preserves bushland within certain urban areas, as part of the natural heritage or for recreational, educational and scientific purposes. The policy is designed to protect bushland in or adjacent to public open space zones and reservations, and to ensure that bush preservation is given a high priority when local environmental plans for urban development are prepared.

Other relevant legislation includes the *Crown Lands Act, 1989, National Parks and Wildlife Act, 1974, Soil Conservation Act, 1938; Noxious Weeds Act, 1993; Rural Fires Act, 1997, Coastal Protection Act, 1979, Protection of the Environment Operations Act, 1997, Companion Animals Act, 1998, and the Contaminated Land Management Act, 1997*.

Other Policies and Programs include *inter alia* - the State Rivers and Estuaries Policy, State Wetlands Policy, Natural Resources Policy Directions Statement (currently in

prep), Water Reform Package, Aquatic Habitat Policy and Guidelines and SEPP No. 32 - Urban Consolidation (Redevelopment of Urban Land).

1.3 Plan First

It is recognised that the planning system in New South Wales, particularly for natural resource planning, is complex, not well coordinated and requires review. 'Plan First' has been developed to address these issues and aims improve the system and devise a simpler, easier to use plan making system.

Plan First will provide a single plan for each local area and a single regional strategy for each region, thereby giving a common direction.

The new local plans will be much broader in terms of what they cover, as they will provide the focus for actions, development and environmental management across the whole local government area. The implementation component identifies actions along with responsibilities, timeframes, priorities, etc and a monitoring or review phase.

A number of pilot areas are being run elsewhere in the state at the time of writing.

1.4 Regional Framework

The relevant regional plans and policies for the management and conservation of biodiversity include:

- *Sydney Draft Regional Environmental Plan (REP) No. 31 – Regional Parklands*. This document refers to parklands containing bushland as being a major resource for Western Sydney. It applies to land in the local government areas of Blacktown, Fairfield and Liverpool. Its objective with regards to bushland is to conserve existing areas and protect them from the impact of development and locate all development on land that is already cleared.
- *Georges River Catchment Regional Environmental Plan No. 2*. This document has been written to protect the environmental and water quality of the Georges River and its tributaries and the catchment as a whole. The REP refers to the coordinated land use planning and development control and establishes the framework within which local, state and federal agencies will consult so that there is a consistent approach to planning and development within the catchment. This REP is currently being reviewed and revised.
- *Catchment Blueprints*. The NSW Department of Land and Water Conservation has produced Catchment Blueprints to guide the long-term management of land in NSW. It is based on setting a range of targets and implementing prioritised management actions to ensure that the best outcome for managing natural resources is achieved. Targets include matters like: 'no net loss of high quality riparian vegetation from 2002'.

Liverpool LGA falls within two separate blueprints, one for the Southern Sydney Catchment and one for the Hawkesbury Lower Nepean Catchment.

- *Cumberland Plain EEC Recovery Plan Working Paper* (NPWS, unpublished(a)). This working paper provides a number of objectives for local government to assist in the recovery of the Cumberland Plain EEC's. Objectives include:
 - To increase the Comprehensiveness, Adequateness and Representativeness (CAR) of the area of Cumberland Plain EEC's protected, through the use of an open space network
 - To provide and implement a decision making framework that will assist in land use planning
 - To implement best management standards for the Cumberland Plain EEC's in order to achieve high quality and ecological integrity
 - To develop public knowledge and awareness of Cumberland Plain EEC's and hence foster community participation in its conservation

The Liverpool Council has been listed as one of the public authorities responsible for the implementation of the recovery plan. The NSW TSC Act therefore requires that Liverpool Council must take appropriate measures to implement actions in the recovery plan. Furthermore, council is required to report on the measures taken to implement those actions. Finally, under the NSW TSC Act, 1995 the council must not make any decisions that are inconsistent with the provisions of the recovery plan (NPWS, unpublished(a)).

As the plan aims for recovery it has set visionary targets for the protection of 30% of the extent of each community as measured or modelled to occur pre European arrival (referred to as pre-1750).

- *Green Web* - The Green Web is a native vegetation management plan which provides a blue print for the protection and enhancement of ecological communities, achievable through its proposed network of corridors across Sydney.
- *Plans of Management*. These are required under the *Local Government Act, 1993* for the management of public lands. They require site-specific plans for lands that are the subject of a recovery plan. A recovery plan is being prepared for the Endangered Ecological Communities (EEC's) on the Cumberland Plain and includes the Liverpool LGA. Therefore this would mean specific plans for these areas.
- *Stormwater Management Plans*. These are required to be prepared under section 12 of the *Protection of the Environment Operations Act, 1997*, within a timely period.

1.5 Local Framework

1.5.1 Background

Local government roles in the 'National Strategy for the Conservation of Australia's Biodiversity' (Department of the Environment, Sport and Territories, 1996) are summarised below. Council roles include:

- Local planning and environmental management
- Standards of land management

- Conservation of native vegetation, including off reserve conservation
- Rehabilitation of degraded areas
- Urban conservation
- Eradication of weeds
- Pollution control
- Implementing National Policies at a local level

1.5.2 Tree Preservation Orders

Liverpool City Council's Tree Preservation Order prohibits the ring barking, cutting down, topping, lopping, removing, injuring or willful destruction of any tree/s over 3 metres tall, within the City of Liverpool. Trees 3 metres or greater in height are protected by a Tree Preservation Order and can only be removed or substantially pruned after a site inspection by the Tree Preservation Officer, and written Council approval (LCC, 2003).

1.5.3 Liverpool City Council Planning Instruments

There are a number of instruments available at a local planning level that can assist in achieving biodiversity planning objectives. These include:

- *Liverpool City Council Local Environmental Plan (LEP)*. The Liverpool City Council LEP provides a guide to land use planning and a management framework for planning decisions. The LEP includes a number of special provisions with respect to biodiversity conservation. The objectives of these special provisions seek a reduction of impacts to the environment.

The most significant of these special provisions is the Environmentally Significant Land (ESL) special provision. A layer has been included on the LEP map, which identifies land that is considered to be environmentally significant. There are a number of ecological values that are covered by this layer, including vegetation identified as Cumberland Plain Woodland. The ESL special provision requires that Council consider a range of factors related to the effects of a development before the granting of development consent. Factors that must be considered include:

- Effects on scenic quality
- Retention of existing vegetation
- Effect on native fauna
- Level of biological diversity, condition and significance
- Effects on corridor provision and connectivity of bushland
- Effects on edge to area ratio
- Effects of land clearing
- Aboriginal cultural significance

The LEP also makes provision for ESD principles and 'total catchment management', as well as requiring that development application determination consider a range of ecological values including threatened species, wildlife corridors and endangered ecological communities.

The LEP also creates a number of zones incorporating environmental protection. These include:

- Rural 1 (c): Rural zone that incorporates Preservation of bushland, wildlife refuges, wildlife corridors and natural habitat as part of its objectives
- Recreation 6 (c): recreation zone that incorporates maintenance, enhancement and rehabilitation of natural systems for environmental protection
- Environment Protection Zones 7(a) waterways and 7(b) bushland: Primary goal is to protect vegetation
- *Liverpool City Council DCP No.8 – Natural assets.* The aim of DCP No.8 is to provide an opportunity to identify and conserve natural assets in the Liverpool LGA, so that development does not jeopardise the protection of those assets (LCC, 1999). It seeks to achieve this by providing guidance for development, redevelopment and subdivision of land that may impact on natural assets. The document's objectives include:
 - Protection and management of local assets, in association with development of land in a manner that reflects ecological, economic and social values
 - Conservation of natural heritage
 - Improvement of amenity and scenic quality
 - Implementation of ecologically sustainable development
 - Maintenance of biodiversity and ecology
 - To enhance water quality
 - To assist in implementation of the TSC Act 1995

DCP No. 8 applies to any parcel of land in the Liverpool LGA that is identified or defined in the LEP as:

- Environment Protection 7(a) Water body
- Environment Protection 7(b) Bushland
- Rural 1(c) Environmental Protection
- Environmentally Significant Land pursuant to clause 16 of the LEP
- Bushland pursuant to clause 17 of the LEP
- A waterbody
- Bushland
- Wetland
- *Various area based DCPs. Liverpool City Council DCP No.1 – Casula West release area, Liverpool City Council DCP No. 2 – Hoxton Park – Green Valley*

Release Area, Liverpool City Council DCP No.12 – Denham Court, Liverpool City Council DCP No.83/2 – Casula East Release Area & Liverpool City Council DCP No 19 – Prestons Industrial Release Area. These DCP's note that the area is the subject of a tree preservation order, and that development in the area is to be carried out so as to retain the maximum number of mature native trees. The developer must apply for permission to remove trees, and all remaining trees on the site of the development will be identified and subsequently protected.

- *Liverpool City Council DCP No. 6. – Industrial Development.* This DCP contains vegetation conservation objectives. They are summarised as follows:
 - To create an ecologically sustainable city that protects and enhances natural features via flora and fauna conservation
 - To enhance significant vegetation and establish corridors that serves both a social and environmental purpose and act as flora and fauna sanctuaries

The DCP imposes controls to achieve these objectives, based upon protection of significant areas of vegetation, and instruments such as SEPP 44 Koala Habitat Protection and the TSC Act, 1995.

- *Liverpool City Council DCP No. 28 – Pleasure Point.* This DCP applies to all development on land in the vicinity of Pleasure Point Rd, Riverview Rd, River Heights Road, and Green St, Pleasure Point. Biodiversity related objectives include the preservation of mature trees, saplings and natural bushland, as well as the reinforcement of the existing vegetation character of the area. The DCP also deals with bushfire risk, and encourages planting of native vegetation, recommending more fire resistant species in fire management areas. The DCP states that the area is subject to LCC's tree preservation controls.
- *Liverpool City Council DCP No. 31 – Subdivision of land in Hoxton Park, Carnes Hill and Prestons residential release areas.* This DCP aims to provide a detailed guide for the subdivision of land in the release areas that it deals with. Biodiversity objectives include the preservation of existing significant trees and native bushland. It states that all significant existing trees shall be retained, relocated or replaced by "species of the same kind". Where land to be developed contains bushland there is a requirement to produce an "Environmental Methods Statement", which requires a range of environmental controls for construction.
- *Liverpool City Council DCP No. 32 – Exempt Development.* The purpose of this DCP is to assist in achieving minimal impact from development that is considered exempt development under the NSW EP&A Act (1979). With regards to biodiversity conservation, development is not considered exempt development where it will be carried out on land that:
 - Has a zoning of 6(c), 7(a) or 7(b)
 - Contains significant vegetation
 - Is reserved or dedicated under the *Crown Lands Act 1989* for environmental protection purposes
 - Is an aquatic reserve declared under the *Fisheries Management Act, 1994*
 - Is flood liable or within 40 metres of a waterway

The DCP also notes that exempt development cannot be carried out on lands that are declared as Critical Habitat, under the TSC Act, 1995, or Wilderness Area, under the *Wilderness Act, 1987*

- *Liverpool City Council DCP No.33 – Complying Development.* The objectives of this DCP relate to providing standards for environmentally responsible development. With respect to biodiversity conservation, complying development is that which:
 - Is consistent with any plan of management approved under SEPP 44 – Koala Habitat
 - Is consistent with any recovery plan or threat abatement plan in force under the TSC Act, 1995 that applies to that land
 - It does not require a tree to be removed
- *Liverpool City Council DCP No. 38 – Telecommunications Towers (Rural Areas).* This DCP ensures that telecommunication towers are located with minimal need for tree removal, and encourages appropriate landscaping around the towers and associated facilities. Tree Preservation Orders must be consulted via the Tree Preservation Officer. The DCP recognises that there may be a need for and 8 part test for significance under the TSC Act 1995 before vegetation can be removed, and also requires a landscape plan to be submitted to council.
- *Liverpool City Council DCP No. 40 – Intensive Livestock Agriculture & Intensive Plant Agriculture.* This DCP deals with land that allows specific agricultural practice in the Liverpool LGA. The DCP requires that a comprehensive Statement of Environmental Effects (SEE) be produced for all poultry farming proposals that will keep up to 250,000 birds. The SEE will need to address a number of issues, including landscaping with native species (although not indigenous natives), pest control and protection and enhancement of existing native vegetation. This DCP also has an objective to ensure sustainable agricultural development, in the context of environmental management and reducing land use conflict.
- *Liverpool City Council DCP No.43 – Kokoda Site.* This DCP has open space and environment protection objectives as well as the tree preservation objectives found in other DCP's. The DCP aims to preserve native bushland and to provide for links between open space and the broader community.

Acronyms

AA	Activity Approval
CAMBA	China-Australia Migratory Bird Agreement
CAR	Comprehensive Adequate Representative, referring to criteria for reserve system under JANIS
CEC	Critically Endangered Community
CPEEC	Cumberland Plain Endangered Ecological Communities
CSIRO	Commonwealth Scientific & Industrial Research Organisation
DA	Development Approval
DCP	Development Control Plan
DLWC	New South Wales Department of Land and Water Conservation
EEC	Endangered Ecological Community listed under the NSW TSC Act
EPA	Environmental Protection Authority
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act, 1999
ESD	Ecologically Sustainable Development
ESL	Environmentally Significant Lands
GIS	Geographic Information System
HOP	Habitat Offsets Policy
JAMBA	Japan-Australia Migratory Bird Agreement
JANIS	Joint ANZECC/MCFFA National Forest Policy Statement Implementation Sub-committee
LCC	Liverpool City Council
LEP	Local Environment Plan
LGA	Local Government Area
NPA	National Parks Association
NPWS	New South Wales National Parks and Wildlife Service
NVC Act	NSW Native Vegetation Conservation Act, 1997. Administered by DLWC
POM	Plan of Management
REF	Review of Environmental Factors
REP	Regional Environment Plan
RLPB	Rural Lands Protection Board
RTA	Roads and Traffic Authority
SEE	Statement of Environmental Effects
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
SOE	State of the Environment Report
SREP	Sydney Regional Environment Plan
TCM	Total Catchment Management
TSC Act	NSW Threatened Species Conservation Act, 1995
UBBS	Urban Bushland Biodiversity Survey
VCA	Voluntary Conservation Agreement
WSUD	Water Sensitive Urban Design

Glossary

<p>Baseline information is information relating to a specific time or defined place, from which trends or changes can be assessed or to which they can be related.</p>
<p>Biodiversity (biological diversity) is the variety of life: the different plants, animals and microorganisms, the genes they contain and the ecosystem of which they form a part. The concept is often considered at genetic, species and ecosystem levels. It is a reflection and essential part of the operation of ecological processes. Whilst some ecosystems are naturally more diverse than others, the amount of diversity does not necessarily directly relate to conservation value or management. Conservation of biodiversity is a fundamental principle of ecologically sustainable development.</p>
<p>Bioregion (or biogeographic region) is a region in which the boundaries are primarily determined by (or reflect) similarities in geology, climate and vegetation.</p>
<p>Bush regeneration means the rehabilitation of bushland from a weed-infested or otherwise degraded plant community to a healthy community composed of native species. Natural regeneration relies on natural germination and resprouting of plants, and focuses on weed removal, management of disturbance and the maintenance of natural processes. It does not normally include replanting of vegetation. Assisted regeneration uses natural regeneration, but also includes intervention actions such as site replanting with locally indigenous seed or plant material derived from the locality (or other similar plant communities to that occurring on the site), or controlled management of disturbance.</p>
<p>Bushland is land on which there is vegetation which is either a remainder of the natural vegetation of the land, or, if altered, is still representative of the structure and floristics of the natural vegetation. Bushland may include regrowth. At any one time some species may only be present as seeds in the soil.</p>
<p>Catchment is the entire area of land drained by a river and its tributaries.</p>
<p>Communities An integrated group of species inhabiting a given area; the organisms within a community influence one another's distribution, abundance, and evolution.</p>
<p>Connectivity is a measure of the degree of interconnection of habitat for a particular species.</p>
<p>Conservation is one of the approaches to ecosystem management. It aims to maintain the continuity of a system, with or without change and refers to the process and actions of looking after a place so as to retain its natural significance. Conservation includes protection, maintenance and monitoring.</p>
<p>Corridors are linear landscape features that connect two or more, larger habitat patches, allowing either movement of individuals, or gene-flow among native fauna and flora.</p>
<p>Covenant is a restriction on the use of land recorded on the property title and binding on successive owners. Covenants may be 'negative' (imposing restrictions) or</p>

<p>'positive' (imposing positive obligations).</p>
<p>Critical habitat refers to habitat that is critical to the survival of endangered species, populations or ecological communities. Part 3 of the Threatened Species Conservation Act 1995 and Part 7A of the Fisheries Management Act 1994 provides for areas of critical habitat to be formally declared.</p>
<p>Cumulative impacts refers to impacts resulting from a multitude of developments or activities, and their interactions in space and time.</p>
<p>Data are raw numbers or other uninterpreted descriptive material.</p>
<p>Database is a collection of data or information. The term is often used to refer to data or information held in a computer.</p>
<p>Design means responding to a set of criteria, constraints and opportunities and achieving a desired outcome. It is a futures-oriented process for making meaningful order.</p>
<p>Development is defined by the Environmental Planning and Assessment Act 1979. It means the use of land, the subdivision of land, the erection of a building, the carrying out of a work, the demolition of a building or work, or any other act, matter or thing controlled by an environmental planning instrument.</p>
<p>Ecological community (or community) is an assemblage of species occupying a particular area. 'Endangered ecological community' is defined under the Threatened Species Conservation Act.</p>
<p>Ecological processes are processes that play an essential role in maintaining the integrity and continuity of an ecosystem. Important ecological processes are water and nutrient cycling, the flow of energy, and evolution by natural selection.</p>
<p>Ecologically sustainable development (ESD) refers to development that uses, conserves and enhances the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future can be increased. It is defined in NSW legislation in terms of the application of principles adopted by the Intergovernmental Agreement on the Environment. These principles relate to precautionary decision-making, intergenerational equity, conservation of biodiversity and valuation of resources.</p>
<p>Ecosystem is a dynamic complex of plant, animal, fungal and microorganism communities and associated non-living environment interacting as an ecological unit.</p>
<p>Endangered Ecological Communities An ecological community (made up of a group of living organisms) listed in schedule x of the NSW TSC Act 1995.</p>
<p>Endemic species Those species that are native to a certain region with restricted distributions and within in restricted range. Outside that restricted range (such as an ecosystem island, or within country boundaries) an endemic species is found nowhere else on earth</p>

<p>Environment The combination of external conditions (both natural and non natural) that influence the life of individual organisms.</p>
<p>Environmental weed is a plant that spreads and invades native vegetation.</p>
<p>Environmentally significant lands Lands that have been marked on a layer of the Liverpool Council LEP.</p>
<p>Fauna means animals (including both vertebrates and invertebrates).</p>
<p>Fire regime refers to the history of fire at a particular place, referring to frequency, intensity and season of burning.</p>
<p>Fragmentation is the process of progressive loss and isolation of habitat.</p>
<p>Goal is a statement of value to be pursued. It is usually stated in a general (and unmeasurable) form. Goals are sometimes referred to as aims.</p>
<p>Habitat corridor is an area of habitat that enables migration, colonisation and interbreeding of plants and animals between two or more larger areas of habitat. Habitat corridors may consist of a sequence of discontinuous areas of habitat (such as feeding trees, caves, wetlands and roadside vegetation).</p>
<p>Habitat is an area or place occupied by a species, population or ecological community. It may be occupied permanently, periodically or occasionally.</p>
<p>Habitat loss is the broadscale removal of vegetation (as opposed to logging, etc).</p>
<p>Habitat value refers to the extent to which an area is capable of supporting large numbers of a range of species. Habitat value is related to the extent of vegetation diversity (both species and structure), and the availability of resources such as nesting places, food and protection from predators, as required by each species present.</p>
<p>Infiltration the process of water entering a hard surface through openings or pores.</p>
<p>Introduced species is a species that is not locally indigenous.</p>
<p>Issue is a point in question or dispute. It is an expression of public importance, concern or contention. Identification of issues is used as a way of focussing and prioritising attention.</p>
<p>Land use refers to the spatial expression of the aggregation of purposes for which land is occupied or employed, and the activities associated with those purposes.</p>
<p>Local refers to the geographical scale comprising a single local government area.</p>
<p>Locality, in relation to biodiversity survey work, generally refers to an area within a 10 km radius of a site. (See also Local).</p>
<p>Locally indigenous species is a species that occurs naturally within a local area and which has genetic material deriving from that local area.</p>

<p>Management plan is a plan that specifies a program of action for managing a particular area of land. Management plans may be: • generic documents that apply to a particular class of sites within a region, catchment or local government area • site-specific documents that apply to an individual property or reserve • statutory documents (such as a 'plan of management' for community land under Part 2 of Chapter 6 of the Local Government Act 1993) • legally binding on private landowners, such as a management plan referred to in a property agreement • advisory documents, such as a farm property plan.</p>
<p>Monitoring is a systematic process involving planned and repeated data collection, analysis, interpretation, reporting and acting on the data.</p>
<p>Native species is normally used to refer to species indigenous to NSW, but is also sometimes used to imply a locally indigenous species.</p>
<p>Native vegetation is vegetation that is indigenous to NSW, that is, of species that existed in NSW before European settlement.</p>
<p>Natural area is a classification assigned to certain community land for the purposes of the Local Government Act 1993. Land should be categorised as a natural area if the land, whether or not in an undisturbed state, possesses a significant geological feature, geomorphological feature, landform, representative system or other natural feature or attribute that would be sufficient to further categorise the land as bushland, wetland, escarpment, watercourse or foreshore.</p>
<p>Noxious weeds are defined in terms of the Noxious Weeds Act 1993.</p>
<p>Objectives are similar to goals, but are expressed in measurable terms.</p>
<p>Offsetting An offset is an action taken away from the development site that may seek to compensate for the loss of vegetation caused by that development site. It may take the form of monetary compensation, revegetation/regeneration etc</p>
<p>Plan of management (community land) (PoM) is a management plan for community land prepared under Part 2 of Chapter 6 of the Local Government Act 1993.</p>
<p>Point sources the originating point of pollution, usually referred to in terms of water quality.</p>
<p>Policy is a statement of values that are to be satisfied when choosing amongst alternatives. It guides ongoing decision-making.</p>
<p>Population is a group of organisms, all of the same species, occupying a particular area.</p>
<p>Preservation is one of the approaches to ecosystem management. It aims to minimise change in a system.</p>
<p>Pre-1750 referring to the distribution of vegetation communities across the Cumberland Plain prior to European settlement..</p>

<p>Principle is a rule of conduct or action that is applied when implementing a policy.</p>
<p>Program is an action specification for implementing a policy. A program should include a timetable, specific actions and allocations of resources. It elaborates and implements policy.</p>
<p>Project is a set of tasks or activities undertaken in pursuit of a particular problem or issue.</p>
<p>Region is a concept used to group geographic areas having some common feature or relationship, generally for the purposes of administration or study. Regions may coincide with natural boundaries such as water catchments, bioregions or landscape units, or with socio economic or other boundaries. Some legislation allows regions to be determined for the purposes of administration.</p>
<p>Rehabilitation is a general concept referring to the restoration and repair of a degraded ecosystem system to a former condition. Rehabilitation may take several forms that, depending upon the degree of naturalness, range between regeneration, restoration, reconstruction, reclamation and stabilisation. Rehabilitation may require implementation of a range of techniques, such as revegetation and weed control.</p>
<p>Restoration capacity is a measure of the difficulty of undertaking ecological restoration at a site. It is based on an assessment of resilience and robustness. This will determine the type of restoration or rehabilitation that it is feasible to undertake.</p>
<p>Restoration is the process of (or end result of) reinstatement of the structure and dynamics of a preexisting community. It is a form of rehabilitation.</p>
<p>Riparian land means any land which adjoins, directly influences, or is influenced by a body of water. This includes land immediately adjacent to small creeks and rivers, river banks, intermittent streams or gullies, and areas surrounding lakes and wetlands on river floodplains which interact with the river during floods. The width of riparian land is largely determined by management objectives, and may need to be defined in terms of distances from water bodies or by mapping.</p>
<p>Sedimentation the process of subsidence and deposition by gravity of suspended matter carried in water; usually the result of the reduction of water velocity below the point at which it can transport the material in suspended form</p>
<p>Species impact statement (SIS) is a study that predicts the harmful effects of a proposed development or activity on threatened species, populations or communities or their habitats, and recommends measures to protect against those effects. It is prepared under Division 2 of Part 6 of the Threatened Species Conservation Act 1995 or Division 6 of Part 7A of the Fisheries Management Act 1994. A species impact statement must be prepared in relation to certain development proposals and activities under the Environmental Planning and Assessment Act 1979.</p>
<p>Species is a group of organisms capable of interbreeding freely with each other but (usually) not with members of other species. It includes any recognised sub-species or other taxon below a sub-species, and any recognisable variant of a sub-species</p>

or taxon.

Strategies are the mechanisms for carrying of goals and objectives into effect. They are action statements explaining how something is to be achieved. Strategies lead to policies and programs.

Target is a more detailed example of an objective. It is expressed as the value of some indicator or other variable that should be achieved by a given date or other predefined circumstance. Targets are often confirmed by a political or community process.

Threatened species is a species considered to be at risk of becoming extinct, or of becoming endangered. Such species are listed in the Threatened Species Conservation Act 1995.

Threatening process is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities.

Understorey any plants growing under the canopy formed by other plants, particularly herbaceous and shrub vegetation under a tree canopy.

Wetland means land periodically or permanently inundated with water, comprising emergent aquatic vegetation dominated by characteristic wetland species. Wetlands include areas commonly described as swamps, mangroves, ponds, lagoons, and the like., The majority of plant species present normally comprise sedges and rushes. Two general types of wetlands are normally recognised, namely freshwater wetlands and saltwater (or estuarine) wetlands.

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