Biodiversity Conservation Strategy 2006

HORNSBY SHIRE COUNCIL

Biodiversity Conservation Strategy

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What is biodiversity?

Biodiversity is the variety of all life forms- the different plants, animals and micro-organisms, the genes they contain and the ecosystems of which they form a part.

Why is it important?

We depend on biodiversity for our survival as it is the *basis* and quality of life. It provides:

- resources such as **foods** for human and animal consumption, **medicines** and the bases for many **industries** such as forestry and farming;
- ecosystem services such as improved **water** quality, **air** quality, **climate** regulation, **soil** and **catchment** protection, storage of **carbon** and **nutrient** cycling;
- **commercial** benefits through substantial savings in rehabilitation costs for degraded land and water based systems;
- Australians with a broad range of expertise and marketable skills in managing natural environments; and
- values that enhance our community including providing **aesthetic** natural landscapes; an **ethical** benchmark of not destroying other life forms and recognising traditional links of **indigenous Australians** to the environment.

What are the threats?

Current threats to biodiversity include clearing of native vegetation, grazing, spread of exotic weeds and pests, altered fire and hydrological regimes, continued degradation of freshwater aquatic ecosystems, and the over harvesting of marine and estuarine resources and impacts on bycatch. The future effects of climate change on biodiversity have been recognised as substantial and will need close attention as they are better understood.

What are we doing?

Hornsby Shire is called 'the Bushland Shire' because of its scenic natural amenity and the high community value placed on our unique bushland environment. Council's response to strategic conservation planning and community expectations has led to the preparation of the Biodiversity Conservation Strategy for Hornsby Shire.

A number of existing frameworks underpin Hornsby's Biodiversity Strategy. These frameworks for biodiversity conservation have emerged at the international, national and state levels over the past decade. They have evolved rapidly with an increasing emphasis on the need to arrest rapid declines in the integrity and abundance of biodiversity across the globe.

Conservation of biodiversity is a fundamental principle of ecologically sustainable development and its loss has been recognised as the most important environmental problem in Australia (State of Environment Report, 1996). The purpose of the strategy is to provide direction for Council and the community to conserve and manage Hornsby Shire's biodiversity at the local level.

How will we do it?

Hornsby's Biodiversity Strategy is an umbrella document that brings together a wide range of information on the biodiversity of Hornsby, why its conservation is important and then provides priorities for action. It aims to conserve both terrestrial and aquatic biodiversity, their habitats and the ecological processes that support them.

Objectives of the Hornsby Biodiversity Conservation Strategy

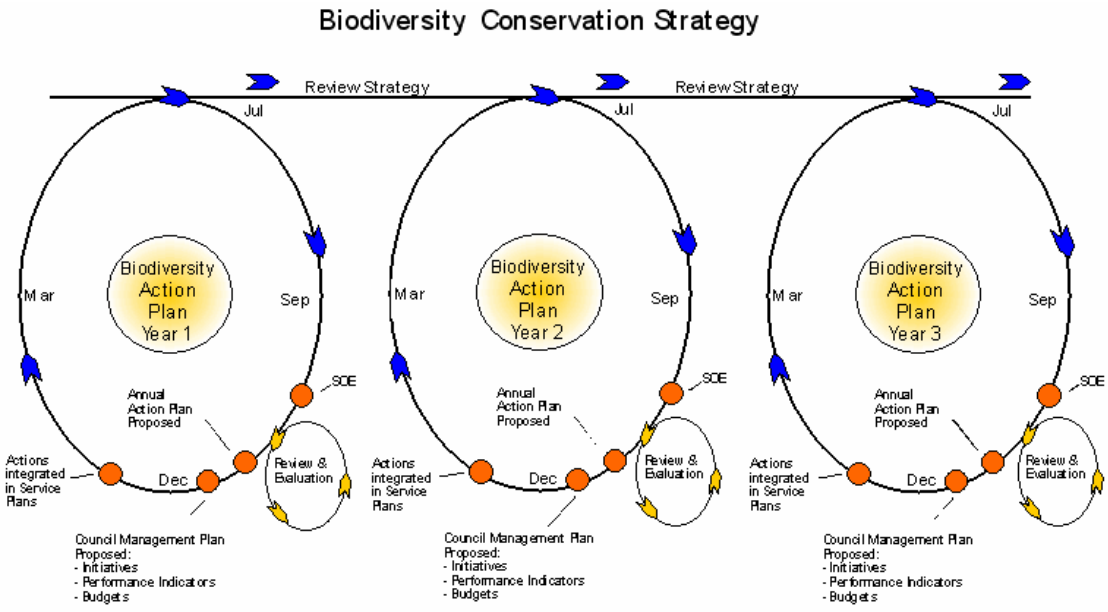
- To conserve species, populations and communities of native plants and animals, and allow for their continued evolution and survival in the Hornsby Shire in context of the region.
- To achieve an improvement in the quality and extent of existing indigenous vegetation in Hornsby Shire.
- To collect and update biodiversity conservation information.
- To develop key community incentive and partnership programs to maintain biodiversity on private properties in the Hornsby Shire.
- To ensure Council activities integrate with other agencies to achieve biodiversity conservation outcomes.
- To ensure environmental planning instruments and processes provide a strategic approach to achieving biodiversity conservation outcomes.

- To maintain and improve the management of biodiversity on publicly owned land in Hornsby.
- To effectively mitigate threats to conserving biodiversity in Hornsby.
- To conserve and recreate connectivity across fragmented landscapes.
- To develop and implement effective systems to fund and manage biodiversity conservation actions.

The complexities of ecological assessment mean that any attempts to assess biodiversity are going to be, at best, collections of representative samples of the total biodiversity of any given area. For example, one of the actions in the Strategy is to set targets for conserving vegetation communities – this is recognised to be only a part of the total biodiversity in the Hornsby Shire. It is envisaged that solutions to biodiversity management generated from this approach and other actions for biodiversity conservation will result in overall positive management effects for a range of other types of biodiversity in the Hornsby Shire.

To implement the strategy Council will prepare an annual Biodiversity Action Plan that becomes part of Council's Principal Activity Service Plan and annual Management Plan. Results of the actions will be reported in the State of the Environment Report, with emerging priority issues being integrated into the subsequent annual Biodiversity Action Plan.

Process of Integration of Strategy and Annual Action Plans into Council Service Plan



Ants feed on honeydew produced by psyllids that shelter under white lerps.

Vision for the Bushland Shire - *"creating a living environment"*

The Biodiversity Conservation Strategy is a key element assisting Council in its path toward sustainability. Through funding and implementing an annual action plan that addresses the broader objectives and regional targets set out in the overarching strategy, Council is actively conserving biodiversity values at the local level. These actions are attempting to address the issue of inter-generational equity by providing a 'Bushland Shire' for residents in the future.

HORNSBY SHIRE COUNCIL

Biodiversity Conservation Strategy

SECTION 1
The Strategy

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The Strategy

1.0 What is Biodiversity?

Biodiversity refers to the variety of all life forms - the different plants, animals and micro-organisms, the genes they contain and the ecosystems of which they form a part. Biodiversity is constantly changing though evolution and extinctions; these events occur as part of natural dynamic systems and can be accelerated by human activities such as habitat degradation causing further population decline and extinction. Biodiversity covers terrestrial and aquatic species and their environments.

Biodiversity is a constantly changing pool augmented by new genetic variation and diminished by extinctions. Much of Australia's biodiversity is yet to be described and there is a dearth of knowledge about almost every major ecosystem type in Australia.

Biodiversity is usually considered at three levels:

- genetic diversity- the variety of genetic information contained in all individual plants, animals and micro-organisms;
- species diversity- the variety of species on earth; and
- ecosystem diversity- the variety of habitats, biotic communities and ecological processes.

What Biodiversity Is

Biodiversity is the variety of all life forms: different **plants** (from lichens and mosses to grasses, shrubs and trees), **animals** (invertebrates, frogs, reptiles, fishes, birds and mammals), the **genes** they contain and the **ecosystems** in which they live.

Biodiversity includes the complex interactions of native plants and animals with each other and their landscape – this is known as **ecosystem processes.**

What Biodiversity Isn't

More is often but not always better. In some ecosystems high diversity may be an indicator of good condition whilst in others, such as a healthy estuarine wetland, may exhibit a very limited number of plant species. Another example is a logged forest which may initially have more species in response to disturbance.

Exotic weeds, pests and microorganisms invading native communities are major threats to biodiversity and instead of enhancing they are depleting our biological wealth.

We depend on biodiversity for our survival as it is the *basis* of our quality of life. Biodiversity provides:

- resources such as **foods** for human and animal consumption, **medicines** and the bases for many **industries** such as forestry and farming;
- ecosystem services such as improved **water** quality, **air** quality, **climate** regulation, **soil** and **catchment** protection, storage of **carbon** and **nutrient** cycling;
- **commercial** benefits through substantial savings in rehabilitation costs for degraded land and water based systems;
- Australians with a broad range of expertise and marketable skills in managing natural environments; and
- values that enhance our community including providing **aesthetic** natural landscapes; an **ethical** benchmark of not destroying other life forms and recognising traditional links of **indigenous Australians** to the environment.

Conservation of biodiversity is a fundamental principle of ecologically sustainable development – its loss was recognised as the most important environmental problem in Australia's first ***State of the Environment Report (SOE).***

The 2001 Australian State of the Environment Report recognised the destruction of habitat as ***the*** major cause of biodiversity loss.

1.1 Threats to Biodiversity Conservation in Australia

Land management issues reported in the SOE affecting biodiversity include clearing of native vegetation, grazing, the spread of exotic weeds and pests, altered fire and hydrological regimes, continued degradation of freshwater aquatic ecosystems, and the overharvesting of marine and estuarine resources and impacts of bycatch. Although the potential effects of climate change on biodiversity have been recognised little research has been done on the detail of the impacts to our ecosystems (Natural Resource Management Ministerial Council (2004).

Berowra Creek mangrove and bushland habitats

The Australian SOE 2001 recognised that many attempts to address biodiversity conservation issues have been inadequate or have stalled, with policies failing to be implemented. Clearly, the sustainable management of Australia's resource base will require many more financial and human resources being directed to support improved understanding and management of the nation's terrestrial and aquatic ecosystems.

1.2 Australia's Unique Biodiversity

Australia's biodiversity is of global significance, being one of only 12 'mega diverse' countries in the world. Over a million species occur in Australia, of which less than 15% have been scientifically described. A very high proportion of our species only occur in Australia – for example 82% of mammals and 93% of frogs. In addition, some whole families only exist in Australia, for example, six mammal, four bird and 14 flowering plant families.

As well as having extremely high levels of endemic species, the mosaic diversity of Australia's species and terrestrial ecosystems exceeds that of any other continent (Commonwealth of Australia 2002). In addition, many of Australia's biota are very primitive species, signalling the geological history of Australia as part of the mega continent Gondwana. However, Australia has one of the highest rates of land clearance in the world, has more mammal species that have become extinct in the last 200 years than any other continent and has only five of its 80 terrestrial biogeographic regions in a natural state.

The report to the Prime Minister's Science, Engineering and Innovation Council (Morton et al. 2002) urges protection and maintenance of our natural systems to avoid an ever increasing repair bill. The high number of threatened ecosystems identified in this assessment indicates how extensive the repair task will be unless comprehensive action is taken.

2.0 How is Biodiversity Conserved? Strategic Framework

The ***Hornsby Shire Biodiversity Conservation Strategy*** has been prepared to be consistent with the laws and policy objectives of the biodiversity conservation framework at the international, national, state and local level.

Appendix 1 contains a more detailed description than that below of the legislative and strategic framework for conserving biodiversity in Hornsby.

2.1 International

The ***Convention on Biological Diversity*** and ***Agenda 21*** were initiated at the United Nations (UN) Conference on the Environment and Development in Rio de Janeiro in June 1992. A comprehensive program of actions is being implemented to halt and reverse effects of environmental degradation to promote sustainable and environmentally sound development in all countries.

The second Earth Summit, held in Johannesburg in August 2002, developed a 10 year implementation and action plan with agreed global priorities for action which included expanding access to water and sanitation, improving energy efficiency, improving agricultural yields, managing toxic chemicals, protecting biodiversity and improving ecosystem management by governments, non-government organisations, intergovernmental organisations and businesses. Over 300 voluntary initiatives have been launched. The Australian Federal Government is now to produce an action plan to ensure these commitments are met, which will require new and additional resources.

A number of other treaties are in place that conserve biodiversity including JAMBA (Japan Australia Migratory Bird Agreement) and CAMBA (China Australia Migratory Bird Agreement).

2.2 National

In 1992 all Australian governments and the Australian Local Government Association signed the ***Intergovernmental Agreement on the Environment*** establishing a cooperative national approach to the environment promoting ecologically sustainable development including conservation of biological diversity. In 1997 this was replaced by the ***Council of Australian Governments - Heads of Agreement on Commonwealth/ State Roles and Responsibilities for the Environment.***

The ***National Strategy for the Conservation of Australia's Biological Diversity 1996*** builds on current and future activities to ensure conservation and ecologically sustainable use of Australia's biological diversity to fulfil Australia's commitment to the International Convention on Biodiversity.

The ***National Objectives and Targets for Biodiversity Conservation 2001-2005*** include:

1. Protect and restore native vegetation and terrestrial ecosystems
2. Protect and restore freshwater ecosystems
3. Protect and restore marine and estuarine ecosystems
4. Control invasive species
5. Mitigate dryland salinity
6. Promote ecologically sustainable grazing
7. Minimise impacts of climate change on biodiversity
8. Maintain and record ethnobiological knowledge
9. Improve scientific knowledge and access to information
10. Introduce institutional reform

2.3 State

NSW Biodiversity Strategy 1999 coordinates government and community efforts to conserve biodiversity and was developed to complement the national biodiversity strategy. The provision of the state strategy is a requirement of the ***Threatened Species Conservation Act 1995***. The strategy's strategic goal is "to protect the native biological diversity of NSW and maintain ecological processes and systems". Councils are being encouraged to prepare local biodiversity plans and strategies as a key action of the state strategy. Wide ranging amendments have recently been made to this legislation

introducing new categories of critically endangered species and communities and vulnerable communities, biodiversity certification of environmental planning instruments and methods to conserve biodiversity such as biodiversity banking.

The ***Catchment Management Act 1989*** focussed attention on the holistic management of catchments to achieve sustainable use of catchments and conservation of biodiversity. Following the introduction of the Act, a number of policies were developed and refined including the ***NSW Rivers and Estuaries Policy***, the ***Estuary Management Policy*** and the ***Wetlands Management Policy***. This Act was superceded by the ***Catchment Management Authorities Act 2003*** which established catchment authorities to prepare and implement catchment action plans. Associated legislation is the ***Natural Resources Commission Act 2003*** which establishes state-wide environmental standards and targets.

The ***Local Government Act 1993*** requires Council to take biodiversity into account in its actions through the Council charter, functions, Management Plan and in plans of management for community land including natural areas. Separate plans of management are required where lands are affected by a Recovery Plan or Threat Abatement Plan (under the ***Threatened Species Conservation Act 1995*** or ***Fisheries Management Act 1994***). Further, biodiversity must be addressed in Council's annual report on the State of the Environment. Any main issues identified are to be considered when preparing a draft Council management plan dealing with environmental protection activities.

Habitat Protection Plans No. 1 and 2 (General and Seagrasses) have been prepared under the ***Fisheries Management Act 1994.*** The Plans balance the needs of fish, fishers and other aquatic resource users to protect fish habitat. Public authorities are required to take the Plans into account in carrying out their duties and functions, with a number of activities requiring the approval of the Minister for Fisheries.

2.4 Regional and Local

Habitat Protection Plan No. 3 for the Hawkesbury Nepean 1998
This Plan applies to the river system and its catchment and aims to prevent further deterioration of fish habitats and to facilitate their rehabilitation.

The ***Hawkesbury Lower Nepean Catchment Blueprint*** was adopted by NSW Cabinet in 2002. The rural and urban parts of Hornsby Shire north of Boundary Road at Pennant Hills are in the Hawkesbury River catchment. This area is covered by the Hawkesbury- Nepean Catchment Management Authority who developed the draft ***Hawkesbury Nepean Catchment Action Plan 2006 -2015*** which covers the main headings of:

- Community and Partnerships
- River Health
- Biodiversity
- Soil and Land

Residents at a property planning workshop

The ***Sydney Harbour Catchment Blueprint 2002*** will also form the basis of the ***Catchment Action Plan*** which is in preparation. There are five themes:

- Biodiversity
- Land Use
- Water
- Community
- Coastal

The largely residential land south of Pennant Hills Road is in the Lane Cove River catchment and falls within the Sydney Metro Catchment Management Authority area.

Council participates in biodiversity management with other Councils and stakeholders in the catchments through a number of initiatives.

Council has implemented the ***Berowra Creek Estuary Management Plan 2000***, which addresses sustainable use and biodiversity

conservation. A draft estuary management plan has been prepared for the Brooklyn area.

The biodiversity conservation actions of the Hornsby Shire Council Sustainability Action Group have centred on developing a set of community sustainability indicators, several of which relate to conservation of biodiversity (see Appendix 5).

3.0 Purpose of the Strategy

The purpose of the strategy is to provide a document that provides direction for Council and the community to conserve and manage Hornsby Shire's biodiversity. The strategy is an umbrella document that brings together a wide range of information on the biodiversity of Hornsby. The strategy considers why biodiversity conservation is important and provides priorities for action. The strategy also aims to conserve both terrestrial and aquatic biodiversity and their habitats.

To implement the strategy Council prepares an annual Biodiversity Action Plan that becomes part of Council's annual Principal Activity Service Plan and annual Management Plan. Results of the actions from the strategy are reported annually in the State of the Environment Report, with emerging priority issues addressed in the subsequent annual Biodiversity Action Plan, Principal Activity Service Plan and Management Plan.

4.0 Objectives of the Strategy

> "*Conserving the biodiversity of NSW is a major challenge. It can't just be done by setting aside land in national parks and reserves; it needs the people of New South Wales to be involved in community conservation across the landscape."*
> Source: www.nationalparks.nsw.gov.au

- To conserve species, populations and communities of native plants and animals, and allow for their continued evolution and survival in the Hornsby Shire in context of the region.
- To achieve net improvement of existing indigenous vegetation and habitats in Hornsby Shire.
- To collect and update biodiversity conservation information.
- To develop key community incentive and partnership programs to maintain biodiversity on private properties in the Hornsby Shire.
- To ensure Council activities integrate with other agencies to achieve biodiversity conservation outcomes.

- To ensure environmental planning instruments and processes provide a strategic approach to achieving biodiversity conservation outcomes.
- To maintain and improve the management of biodiversity within publicly owned land in Hornsby.
- To effectively mitigate threats to conserving biodiversity in Hornsby.
- To conserve and recreate connectivity across fragmented landscapes.
- To develop and implement effective systems to fund and manage biodiversity conservation actions.

5.0 Why Conserve Biodiversity in Hornsby?

5.1 Hornsby - the Bushland Shire

In the context of global imperatives for the 21st century and the significance of Australia's biodiversity, Council's response to strategic planning and community expectations has led to the preparation of a biodiversity conservation strategy for Hornsby Shire which is known as 'the Bushland Shire'. In the Customer Satisfaction Survey, the community has ranked bushland management as the third most important function of Council. In its strategic planning, Council has recognised the importance of conserving the native flora and fauna characteristics of the Hornsby area. It is recognised as an important characteristic of the Shire in the Rural Lands Study, the Sensitive Urban Lands Study Council, the Fauna Corridors Study, Threatened Biota Conservation Plan, the Bushland Plan of Management 1999, the Sustainability Review of Hornsby Shire Local Environmental Plan, development control plans and the current review of Biodiversity Planning Provisions.

Hornsby Shire is characterised by large tracts of bushland, estimated at 69% of the Shire in 1990 (Smith & Smith). One regional park and several large national parks account for a significant area of bushland, featuring vegetation growing on the infertile soils and deeply dissected Hawkesbury

Sandstone terrain. Hawkesbury Sandstone vegetation represents probably the richest assemblage of xeromorphic species in eastern Australia and is a remnant of the assemblage that has spanned the continent in the past, especially the south. The parks feature large numbers of rare species of flora and very high diversity of species.

The Shire lies within the Sydney Basin bioregion and the Central Coast Botanical Subdivision and thus has features characteristic of both.

The Hornsby Plateau and Hawkesbury Valley form the major physiographic regions of the area. The Shire is located on part of the northern rise of the Sydney Basin and feature a broad dissected plaeau known as the Hornsby Plateau, which is capped in places by Wianamatta Shales. Further north and east the deeply dissected sandstone Hawkesbury valleys occur which feature the drowned river system of the Hawkesbury River and its tributary creeks. The estuaries were formed during the end of the last ice age and stabilised approximately 6,000 years ago.

Berowra Creek is a major tributary of the lower Hawkesbury River, entering the Hawkesbury River some 25 kilometres from the ocean. The estuary itself extends for over 23 kilometres in a southerly direction from the Hawkesbury River to the tidal limit at Rocky Fall Rapids. Marramarra Creek estuary extends in a westerly direction from near the confluence of Berowra Creek and the Hawkesbury River for over 7 kilometres. Berowra Creek estuary is a drowned river valley, comprising steeply incised gorges with surrounding plateau areas.

The upper estuary, upstream of the Woolwash, is very shallow with depths often less than 1m. The channel becomes deeper and reaches a depth of approximately 7m at Berowra Waters. Through the middle estuary, and particularly at Calabash Point, there are a number of deep holes up to 17m deep which provide habitats and influence the flushing characteristics of the estuary.

The lower estuary is generally around 5m deep, although at the Hawkesbury River bar the depth is only 3m. The lower west zone of the estuary, Marramarra Creek, is much shallower with depths of 2m or less. The shallow muddy bays provide ecologically productive environments. Big Bay is one such area and has regional significance because of its mangrove community.

The following description of the geology, terrestrial vegetation and landuse patterns is adapted from Howell (2000). Hornsby Shire's

vegetation today is a result of the underlying geology, landform and microclimate and the historic effects of clearing of vegetation.

The underlying geology of Hornsby Shire is formed predominantly of sandstone, with a capping of shale on the higher ridgelines. Shale capping extends along some of the major road systems including Old Northern Road from Castle Hill to Glenorie, and along Galston, Arcadia and Bay Roads through Galston, to Arcadia and Berrilee. Away from the ridgelines further downslope sandstone geology appears. Towards the northern end of Old Northern Road near Forest Glen, Maroota and Fiddletown, the shale cappings have become discontinuous due to large scale erosion of the shale over millions of years. Several other types of geology occur in very limited areas such as volcanic diatremes around Hornsby and Westleigh, sand deposits at Maroota, and geologies associated with the Hawkesbury River and other riparian areas, namely, Narrabeen shales and alluvial flats.

Sandstone vegetation at Cowan

5.2 Native Vegetation, Creeks and Estuaries in 1788

Shale

In 1788 the shale areas were covered with tall open forest up to 30m. Trees suited to the more fertile soils included Grey Ironbarks, Turpentines, White Stringybarks and less commonly Red Mahoganies, with Blackbutts and Sydney Blue Gums growing where conditions were particularly favourable. In these forests an understorey of smaller trees and shrubs would have included Forest Oak, Hickory Wattle and Cheese Tree in the drier areas and Sweet Pittosporum trees, vines and ferns in the moister drainage lines. This type of forest is now known as Sydney Turpentine-Ironbark Forest.

Transition Areas

As shale gave way to sandstone on the ridgelines there was often a transitional area with a distinctive assemblage of species, often including the Grey Gum (the favoured food tree of koalas) and Stringybarks.

Sandstone

Bush on sandstone country featured a tremendous variety of habitats and plant species in a relatively small area of sandstone terrain. The sandstone topography gave rise to a great variety of habitats because of its rugged nature – ridgetops, slopes of varying steepness facing north, east, south or west each with different characteristics of sunlight and moisture availability, gullies and valley floors with varying amounts of deposited soil with differing degrees of shale influence from soil washed down over time from the shale cappings. The variety of habitats included:

- woodland on ridgetops and exposed north and west facing slopes;
- open forest on the more sheltered east and south facing slopes and on lower parts of exposed slopes;
- dense open forest where valleys were sheltered and enriched by shale-derived soil, for example, Blackbutts and Coachwoods grew at the bottom of Galston Gorge;
- riparian scrub supporting a distinctive group of species on small sandstone creek lines;
- patches of shrubby heaths and sedge heaths where lenses of shale were found within the sandstone, giving rise to local variation in soil fertility and drainage.

Riverine

Along the banks of the Hawkesbury River downstream from Wisemans Ferry and along the lower reaches of Berowra and Marramarra Creeks, Narrabeen shales and sandstones appeared. Rough-barked Angophora and Forest Oak characterised the open-forest on the more fertile Narrabeen-based soils.

Estuarine vegetation on Marramarra Creek

Creeks

Creeks of the Hornsby Shire were divided into four catchments: Berowra Creek, Lane Cove River, Cowan Creek and Hawkesbury River. Some creek reaches were characterised by wide, sandy flat-based ponds, or sandstone with cobbles in the cracks at the base of the creek, others featured rapids, riffles, rock chutes, waterfalls and potholes, yet others had boulders with underlying rock shelves, or sand and mud based streams. The Berowra Creek catchment included Colah Creek, Still Creek, Georges Creek, Pyes Creek, Larool Creek, Waitara Creek, Tunks Creek and Calna Creek. The Lane Cove River catchment included Terrys Creek, Devlins Creek and Browns Waterhole and the Cowan Creek catchment included Hornsby Creek, Cockle Creek and Murray Anderson Creek. Some of the creeks of the Hawkesbury River catchment included Mill Creek, Dalgety Creek, Ashdale Creek and Pumpkin Point Creek.

Estuaries

Estuarine vegetation of the Hawkesbury River, Marramarra, Berowra and Cowan Creeks and other tributaries were characterised by small areas of saltmarsh, stands of mangroves and seagrass beds. Of particular significance were large mangrove forests in Big Bay, Marramarra Creek which feature the Grey Mangrove and River Mangrove. Saltmarshes existed in small pockets above mangrove stands in areas of land that were intermittently inundated by tides. Seagrasses were characterized by Eelweed in the Hawkesbury, Berowra Creek and Cowan Creek and Strapweed in scattered beds in Cowan Creek.

5.3 Patterns of Settlement and Vegetation Today

Historic patterns of settlement left poor infertile soils of the sandstone country and the inhospitable terrain undeveloped with clearing and farming taking place on gentler topography and more fertile soils. Many rural properties have an arable area on shale nearest the road and back onto steeper sandstone bushland near creek lines. Hence the plants and animals now remaining on the richer shale soils or flatter land are rare and poorly conserved in Hornsby. As a result of these patterns, over 50% of Hornsby's plant communities are not conserved in any parks or reserves and two other vegetation communities (Swamp Sclerophyll Forest on Coastal Floodplains and Freshwater Swamp) have almost totally been removed through clearing (Smith and Smith 1991).

Shale

Native vegetation that remains on shale is generally as small remnants around the edges of cleared agricultural land or as small backyard patches in urban areas such as Pennant Hills and Beecroft. These small remnants are often invaded by weeds, but each shale vegetation remnant is important because there is so little of this type of vegetation left. In the whole Sydney area, less than 1% remains of the original area of Sydney Turpentine-Ironbark Forest and Blue Gum High Forest. Because only small remnants remain, no single remnant of this rare forest is likely to contain representatives of all the plant species native to the shale. Therefore each remnant patch is valuable for the species it does contain, including the soil seed bank. Some may contain native plant species that occur in very few other places and are often confined to narrow roadsides. Even though the remnants may be weed infested, all the native smaller trees, shrubs, ground cover plants and grasses in the remnant shale vegetation patches are important, not just canopy trees (Howell, 2000).

Sandstone

Most of the native vegetation that remains in the rural area is on sandstone. Sandstone terrain is much more rugged than that of the shale, and its soils are sandy, infertile and often very shallow, making them unsuitable for agriculture. It is for these reasons that so much of the sandstone still retains its native vegetation, and Marramarra National Park and Berowra Valley Regional Park are predominantly sandstone country.

Remnant trees in Hornsby's rural district

Two types of sandstone habitat are particularly vulnerable to loss and degradation – ridgetops, likely to be cleared because they are level and easily accessible, and creek banks and valley floors, prone to weed invasion. A number of rare species occur only in the Hornsby area in sandstone habitat, so these areas are in need of special consideration for conservation.

Sandstone gullies, valleys and creek banks become invaded by weeds when their soil is enriched by nutrients washed down in runoff water from developed areas. Developments need to be more closely managed to prevent soil erosion, as sandstone is highly erodible, and nutrient enriched runoff in order to prevent weed invasion in valley bottoms. These actions will also protect water quality and aquatic ecosystems.

Transition Areas

Transition areas between shale and sandstone are also vulnerable like the other level ridgetop areas. This habitat is limited in area and is also likely to have Shale/Sandstone Transition Forest, an Endangered

Ecological Community, as well as threatened species such as the rare Heart-leaved Stringybark on Tunks Ridge. Transition areas, like other ecotones, are highly diverse communities with a mix of shale and sandstone species. Other transition communities include Duffys Forest also an Endangered Ecological Community.

Volcanic Areas

A small number of diatremes or outcrops of volcanic rock occur, namely off Fagans Ridge and Coba Ridge, in Cabbage Tree Hollow, Pyes Creek and Old Mans Valley. Species composition varies between these scattered volcanic outcrops and reflects their greater soil fertility.

Deep Sand Deposits

The deep sand deposits that are being mined at Maroota are geologically unique within the Sydney area, and, where they remain, support native vegetation with a number of rare or uncommon species.

Alluvial Areas

Smaller areas of alluvial land amongst steep sandstone hillsides along the Hawkesbury River near Wisemans Ferry and downstream support distinctive riparian and wetland groups of plant species – these are vulnerable because of their accessibility for clearing and their limited extent (Howell 2000).

Doryophora sassafras, Hornsby

5.4 Creeks and Estuaries Today

The upper reaches of the Lane Cove River catchment are dominated by housing, commercial areas and Lane Cove National Park bushland lower in the catchment. The creeks are characterised by weed invasion, streambed siltation, rubbish dumping, sewer overflows, bank erosion and poor water quality.

Within the Cowan Creek catchment, land uses include extensive light industrial areas, large commercial shopping centres and developed urban areas. Ku-ring-gai Chase National Park also covers a large part of the catchment. Some creeks are in very good condition, however, some have been converted to open drains, and others have rubbish dumped along the banks, weed invasion and streambed siltation.

The Hawkesbury River catchment includes the Wisemans Ferry/Maroota region and the Brooklyn area which drains directly to the Hawkesbury River. Landuses include small farming ventures, market gardening, housing, marinas, boat ramps, aquaculture and fishing (commercial and recreational).

Spiny Cray, Galston

The Berowra Creek catchment is bounded on the south by Castle Hill Road, to the west by Old Northern Road to the north by the Canoelands Ridge and to the east by the Pacific Highway. The catchment is highly developed in the south with the residential, industrial and commercial development of Hornsby and its surrounding suburbs. The north of the catchment is predominantly bushland and comprises Marramarra National Park, Muogamarra Nature Reserve and Berowra Valley Regional Park. The semi-rural areas of Arcadia, Galston and Glenorie are situated to the west of the creek. Some parts of the tributary creeks in the Berowra Creek catchment feature weed invasion, garden plants and waste, streambed siltation, rubbish and gross pollutants from stormwater drains, bank erosion, undercutting, tree death and poor water quality. Those catchments with more bushland generally have a higher proportion of sensitive families of aquatic macroinvertebrates.

Berowra Creek's steep topography limits development directly adjacent to the waterway, most of which is only accessible by boat. There are river

settlements in the Berowra Waters/Calabash Bay area, Neverfail Bay, Coba Point and the entrance to Marramarra Creek.

In addition to residential development, Berowra Waters is the primary access point to the waterway. The area provides a marina, restaurants, a public boat ramp and wharves, parking and other amenities. A significant feature is the vehicle ferry across the waterway. Crosslands Reserve in the upper estuary is the only other part of the estuary accessible by motor vehicle. Development at Crosslands consists of a Youth and Convention Centre, and a public reserve with picnic facilities.

The estuary is popular for recreational boating and fishing. It is also used by commercial fishing operators. The lower estuary is used for oyster aquaculture, with Berowra and Marramarra Creeks providing areas for the growth and fattening of oysters.

Through the middle estuary, and particularly at Calabash Point, there are a number of deep holes to depths of 17 m, which can slow the water down and assist the formation of algal blooms.

There were nineteen EPA licensed discharges in the catchment, mainly related to sewage outlets. The catchment contains two sewage treatment plants (STP), Hornsby Heights STP and West Hornsby STP. Water quality and aquatic macroinvertebrate indicators of ecosystem health improved with distance downstream from the STPs. The semi-rural areas around Arcadia, Galston and Glenorie as well as the river settlements are unsewered and rely on on-site treatment. Many of the river settlements such as Berowra Waters and Calabash Bay have reticulated water, but rely on on-site sewage treatment.

Estuarine vegetation in the Hawkesbury River and creeks is being impacted upon by a variety of processes, resulting in loss of saltmarsh due in part to mangrove encroachment, expansion of mangrove areas due to sediment accretion, and physical damage to seagrass beds due to outboard motors.

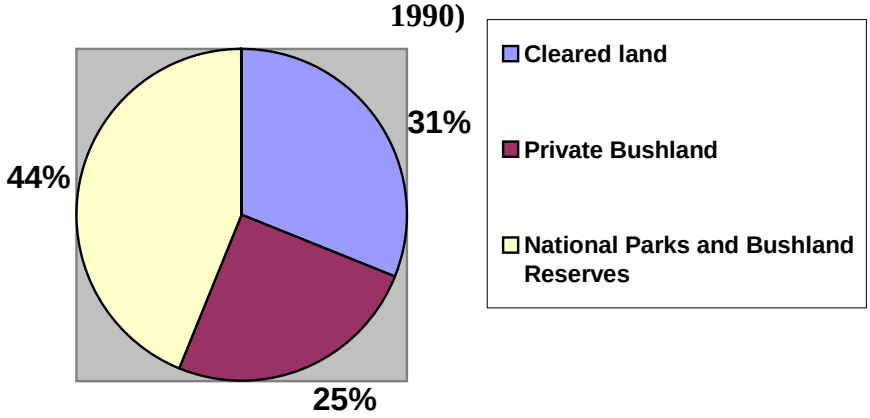
6.0 Biodiversity Values of the Hornsby Shire

Hornsby forms part of the Sydney Basin Bioregion and is located on the geological formation known as the Hornsby Plateau. Over 1,000 native vascular plants and 388 terrestrial vertebrate animals are known to occur in the bushland of the Hornsby Shire. The number of invertebrate species is unknown, as is the number of aquatic species, although a

recent survey of aquatic bioindicators found 230 discrete taxa of macroinvertebrates and 8 native fish species (Tuft *et al.* 2001).

Despite large national and regional parks in the Shire conserving the diverse sandstone flora and fauna, whole plant communities and large numbers of species remain either unprotected or are critically endangered in Hornsby. In 1990, 24 plant communities were identified in the Shire, 13 of these communities were poorly conserved and two additional plant communities appeared to have been almost completely cleared.

Figure 1: Native Vegetation in Hornsby Shire (Smith & Smith, 1990)



6.1 Council Bushland and National Parks in the Hornsby Shire

The Smith and Smith (1990) study revealed that 44% of the Shire's bushland is protected in major reserves in the Shire such as national and regional parks, nature reserves and Council reserves.

18,660 ha is managed by NPWS including:

- Berowra Valley Regional Park (under joint management with HSC)
- Marramarra National Park
- Lane Cove National Park
- Muogamarra Nature Reserve
- Long Island Nature Reserve
- Ku-ring-gai Chase National Park,

Council manages approximately 2,000 ha bushland in Council reserves and jointly manages 3,880 ha in Berowra Valley Regional Park. These

reserves provide important habitat for biota dependent on deeply dissected Hawkesbury Sandstone gully systems.

6.2 Terrestrial Biodiversity Outside the Reserve System

Smith and Smith (1990) estimated that 31% of Hornsby Shire's 51,300 ha had been cleared. An additional 21% or 11,000 ha of the Shire's bushland and its native species occur outside the protection of the national parks and Council reserves.

The unprotected bushland areas and species feature distinctively different native plants and animals to those protected within the reserve system. These communities occur on the more fertile Wianamatta Shale, on volcanic diatremes and on the Hawkesbury River floodplain and have been extensively cleared due to flatter topography and more fertile soils and are hence now quite rare. A number of plant and animal communities are inadequately conserved, if they are present at all in the major reserves (Smith and Smith 1990 and Smith and Smith 2006). In addition two floodplain communities appear to have been almost completely removed from the Hornsby Shire by previous clearing.

Sandstone vegetation Muogamarra Nature Reserve

Table 1: Conservation Status of Vegetation Communities in Hornsby Shire

Note: Vegetation communities have been classified by Smith and Smith (2006) – a full description of each community appears in Appendix 11.

Vegetation Symbol	Vegetation Community	Conservation Status	Ha
A	Peppermint-Angophora Forest		5579
B	Narrow-leaved Apple Gully Forest	Regionally Significant in Sydney	93
C	Bloodwood-Scribbly Gum Woodland		644
D	Grey Gum-Scribbly Gum Woodland		4403
E	Silvertop Ash-Scribbly Gum Woodland	Localy Significant in Hornsby	47
F	Narrow-leaved Scribbly Gum Woodland		1289
G	Scribbly Gum Open-woodland/ Heath		660
H	Rock Platform Heath	Regionaly Significant in Sydney	19
I	Sandstone Wsamp	Regionaly Significant in Sydney	10
L	Blackbutt Gully ForestP	Localy Significant in Hornsby	836
O1	Coachwood Rainforest	Regionaly Significant in Sydney	108
O2	Grey Myrtle Rainforest	Regionaly Significant in Sydney	11
DF	Duffys Forest	Endangered community in NSW	15
T	Yellow Bloodwood Woodland		284
J	Blue Gum Diatreme Forest	*Critically Endangered community in NSW	14
N	Blue-leaved Stringybark Diatreme Forest	Regionaly Significant in Sydney	8
BG	Blue Gum High Forest	Critically Endangered in Australia and *NSW	42
RF	River-flat Eucalypt Forest	Endangered community in NSW	6
TI	Turpentine-Ironbark Forest	Critically Endangered in Australia, endangered in NSW	301
Q1	Rough-barked Apple- Forest Oak Forest	Regionaly Significant in Sydney	271
Q2	Blackbutt-Rough-barked Apple Forest	Regionaly Significant in Sydney	7
R	Narrow-leaved Apple Slopes Forest	Regionaly Significant in Sydney	282
SS	Shale/Sandstone Transition Forest	Endangered in Australia, endangered in NSW	5
S	Angophora Woodland	Localy Significant in Hornsby	62
SF1	Swamp Mahogany Forest	Endangered community in NSW	7
SF2	Floodplain Paperbark Scrub	Endangered community in NSW	12
SF3	Floodplain Reedland	Endangered community in NSW	20
SO	Swamp Oak Floodplain Forest	Endangered community in NSW	110
W	Mangrove Swamp	Localy Significant in Hornsby	321
CS	Coastal Saltmarsh	Endangered community in NSW	53

6.3 Threatened Species, Endangered Populations and Endangered Ecological Communities

Many of the poorly conserved vegetation communities were listed as Endangered Ecological Communities by the NSW Scientific Committee under the *Threatened Species Conservation Act 1995*. Those which occur in the Hornsby Shire are:

- Blue Gum High Forest
- Duffys Forest
- Shale/Sandstone Transition Forest
- Sydney Turpentine- Ironbark Forest
- River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions
- Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions
- Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions
- Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions
- Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregion

Recently a Preliminary Determination has been made to list Blue Gum High Forest as a Critically Endangered Ecological Community in the Sydney Basin Bioregion, including Blue Gum forest that occurs on Wianamatta Shales and Volcanic Diatremes.

The NSW Scientific Committee listing of Sydney Turpentine-Ironbark Forest estimated that only 0.05% of the original vegetation community remains. It is important to note that this listing also defines individual remnant trees as being part of the Endangered Ecological Community. Likewise the Scientific Committee listing for Blue Gum High Forest recognised that only 1% of the original forest remains.

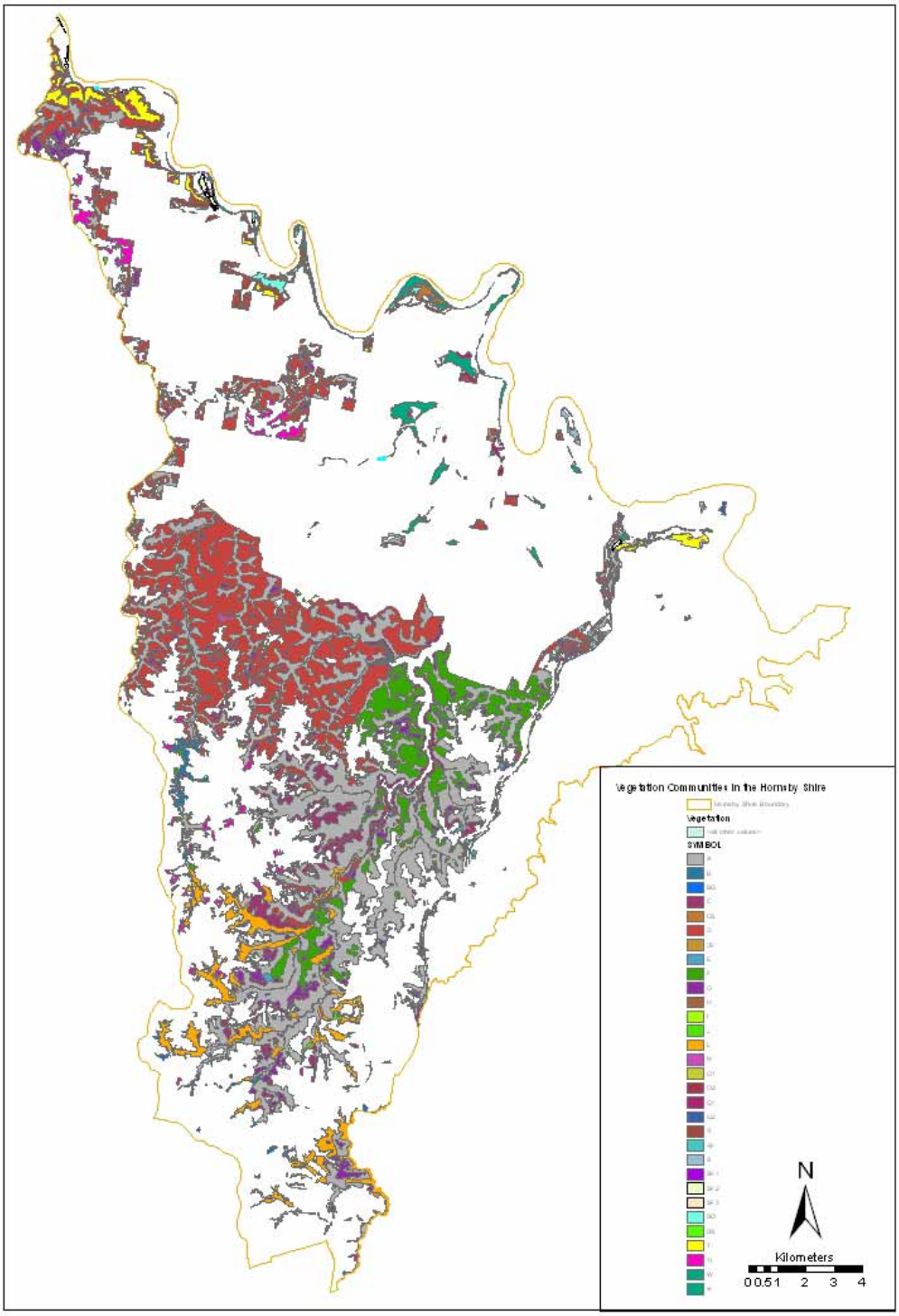
A report and mapping project has been undertaken on Endangered Ecological Communities in the Hornsby Shire (Lembit 2002, Lembit and HSC mapping 2002 & 2003). This project found that there are currently 529 ha of Endangered Ecological Communities in 326, often degraded, separate patches with an average size of 1.6 ha each. Eighty-nine percent of Endangered Ecological

Communities occur on private land with only 58 ha (11%) on public land (see Appendix 14).

Only 37 ha of Blue Gum High Forest remains in Hornsby Shire, most of which is modified or degraded to highly degraded, and is critically endangered. Often these areas consist of clumps of trees in urban landscapes in less developed sites such as Council reserves, large backyards, creek lines and schoolyards. These sites are of natural heritage significance as they are remnants of past vegetation. They contain genetic material indigenous to the area and provide habitat for native fauna including threatened species and endangered populations. They also form parts of corridors and urban habitat links and contribute to the landscape character of the suburb. Often the conservation value is overlooked due to their small size, the urban setting, the level of exotic vegetation or mown nature of the understorey. The appearance or the remnants to the community is often one of a weed infested patch rather than pristine looking bushland.

Blue Gum High Forest Remnant at Mount St Benedict High School

Vegetation Communities in the Hornsby Shire (Smith and Smith 2006)



In addition there is only 195 ha of Sydney Turpentine-Ironbark Forest remaining in 2003 in urban, rural and roadside areas with similar issues of small patch size, weedy understorey and uninspiring visual appearance. Restoration potential of such remnants is high – James (1994) and Lewis (2001) have documented the high level of resilience in shale based vegetation communities. Demonstration of this phenomenon can be seen at Observatory Park in Pennant Hills and Reddy Park in Hornsby.

To date, there are 26 known threatened plant species and 42 species of animals listed as threatened that are either known (27) or likely to occur (15) in Hornsby Shire. These are detailed in Appendix 2.

Blue Gum High Forest Tim Brownscombe Reserve

6.4 Other Vegetation and Habitats of High Conservation Value

Native vegetation remaining on ridgetops is now quite rare, as it has historically been cleared due to its gentler topography. These remnant

vegetation communities are located just below the shale areas and on the Hawkesbury Sandstone ridgetops associated with the Lucas Heights Soil Landscapes. The remaining plant communities, especially Silvertop Ash-Red Bloodwood-Scribbly Gum community, are now considered to be of high local conservation significance.

In addition two plant communities occur on highly restricted areas of volcanic diatremes and are considered to be of regional conservation significance, namely Blue Gum Glen Forest and Blue –leaved Stringybark - Rough-barked Angophora Glen Forest communities.

Intertidal estuarine plant communities such as Melaleuca freshwater swamp are both rare and poorly conserved and of high local conservation significance. A number of other plant communities, habitats and species are considered to be of high conservation value at the local or regional level. A complete list appears in Appendix 3.

As part of Council's vegetation survey work, those plant species which only occur at 2% of sites have been classified as regionally and locally significant in that they may become locally extinct in 20 years if not recognised and afforded conservation status and protection (Lembit, pers. comm. 2002). These also appear in Appendix 3.

6.5 Migratory Species

A comprehensive assessment of migratory species and potential habitat has not been undertaken in the Hornsby Shire and is a high priority, as habitats in Australia form a critical part of a migratory flyway around the world. A number of migratory species listed on the JAMBA and CAMBA migratory bird agreements annually visit sites in the Hornsby area and rely on these habitats for resting and feeding prior to returning to the northern hemisphere. The preliminary list of species known or potentially occurring in the Hornsby Shire are outlined in Appendix 4.

The Commonwealth *Environment Protection and Biodiversity Conservation Act* identifies 'listed migratory species' (see Appendix 4) as of national environmental significance. Under the Act the Commonwealth assesses developments that will have a significant effect on the migratory species. In addition a number of vagrant or nomadic species listed under the *Threatened Species Conservation Act* occur in Hornsby including the endangered species Regent Honeyeater and Swift Parrot, and the vulnerable species Osprey and Superb Fruit-dove.

Under the Threatened Species Conservation Act -

'endangered species' means a species

- likely to become extinct in nature in NSW unless the circumstances and factors threatening its survival or evolutionary development cease to operate, or
- Its numbers have been reduced to such a critical level, or its habitats have been so drastically reduced, that it is in immediate danger of extinction, or
- It might already be extinct, but is not presumed extinct, and

'vulnerable species' means a species likely to become endangered in NSW unless the circumstances and factors threatening its survival or evolutionary development cease to operate.

Source: NSW Scientific Committee criteria for listing of species – National parks website.

6.6 Fauna Corridors and Vegetation Links

To ensure movement of fauna and to improve the connectivity between reserves thus enhancing the viability of plant and animal conservation in the area, Council has undertaken several studies (Fallding et. al, 1994; *Urban Bushland Management for Hornsby Shire Council* 2001) to investigate the location and management requirements of fauna corridors and vegetation links, aiming to maintain and enhance them where possible. Many of the links or corridors are awaiting works or protection.

Common Ring-tail Possum, Eastern Water Dragon, *Grevillea speciosa*, Giant Burrowing-frog

Fertile Soils, Infertile Soils and Soils Associated with Riverine Environments in the Hornsby Shire

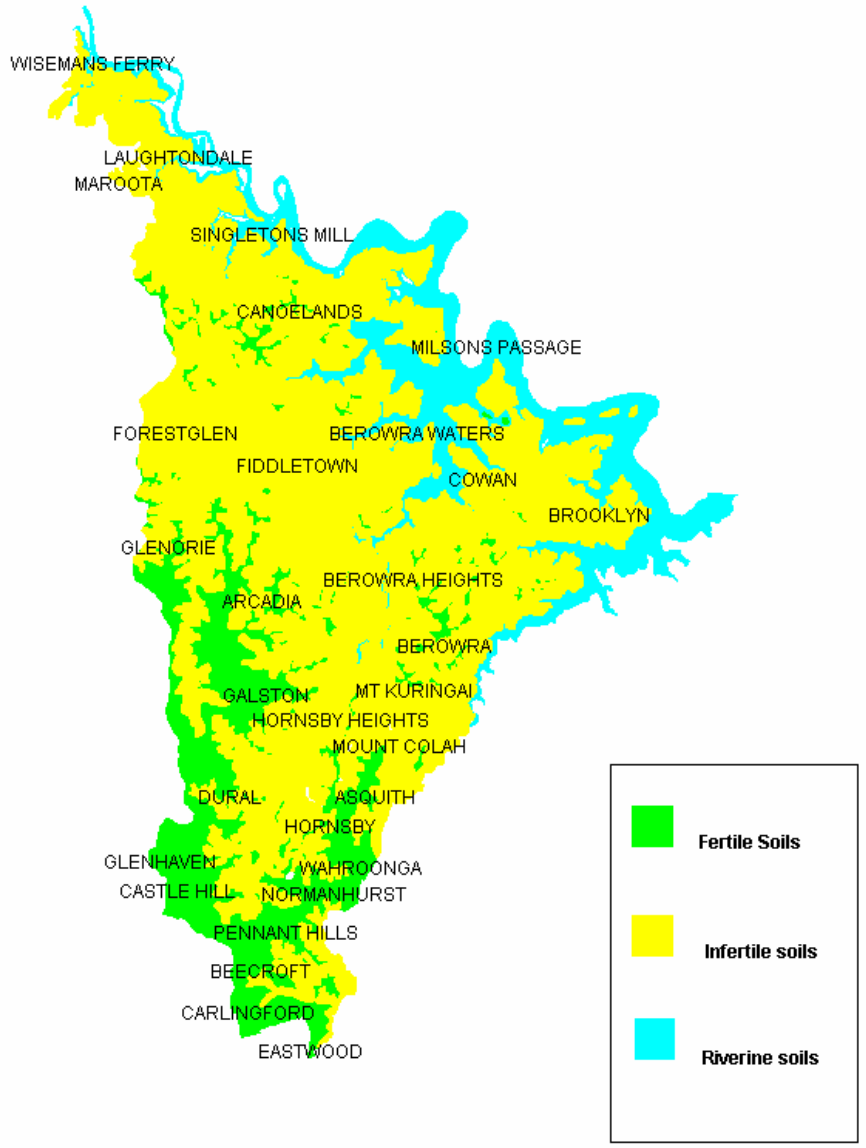


Table 2: Snapshot of biodiversity associated with more fertile soils derived from Wianamatta Shale and Volcanic Diatremes

Geology	Wianamatta Shales and Volcanic Diatremes
Description	Wianamatta Shale occurs on the plateaux and ridgetops of the Hornsby Plateau. It lies over Hawkesbury Sandstone. The Ashfield Shale formation caps many ridges north along the Pacific Highway and along two ridges extending north from Dural to Fiddletown and is comprised of laminate and dark grey shale. Volcanic breccia and basalt occur as diatremes at Hornsby as a complex system of small intrusive dykes. They are usually basaltic and are seldom more than 3m wide.
Vegetation of State Conservation Significance	**Endangered Ecological Communities on Wianamatta Shale** • **Blue Gum High Forest (Community BG)** • **Sydney Turpentine-Ironbark Forest (CommunityTI)**; • **Blue Gum Diatreme Forest (Community J)** – preliminary listing as critically endangered **Threatened Species on Wianamatta Shale** *Epacris purpurascens* var. *purpurascens* (Vulnerable)
Vegetation of Regional Conservation Significance	**Significant Vegetation Communities on Volcanic Diatremes** • Glen Forest – *E. saligna* Tall Open Forest (Community J) and *E. agglomerata – Angophora costata- Allocasuarina torulosa* Open Forest (Community N)
Pre-settlement vegetation	Wianamatta Shales supported Tall Open Forest of Blackbutts, Blue Gum and Turpentine on the ridge tops at Beecroft, Thornleigh, Pennant Hills, Wahroonga, Glenorie, Galston, Dural & Arcadia. Volcanic diatremes are known from Old Mans Valley & Westleigh.
Post-settlement vegetation	The flatter and more fertile areas were extensively cleared for agriculture and urban development.
Land Use	The major activities are urban residential and rural landuse, mostly hobby farms and small rural subdivisions, including equestrian activities, orchards, cut flower production and market gardens.
Waterways	The areas are located in the headwaters of Lane Cove River, Cowan Creek and Berowra Creek.
Public Land	Important parks and reserves include Tim Brownscombe Reserve and Carrs Bush in Fagan Park.
Conservation Status	**Sydney Turpentine-Ironbark Forest (Community TI)**– Endangered Ecological Community in NSW. 99.5% of the original extent of the community has been cleared. Critically endangered ecological community nationally. **Blue Gum High Forest (Community BG)** – Endangered Ecological Community in NSW. Because of the more fertile soils and easier topography 99% of once extensive community in Sydney have been cleared. Only few small relict stands remain. Critically endangered ecological community nationally. Preliminary listing as critically endangered (state) **Blue Gum Diatreme Forest (Community J)**- Depleted by extensive quarrying in Old Mans Valley. Preliminary listing as critically endangered (state) **Blue-leaved Stringybark Diatreme Forest (Community N)** – Significant in Sydney Region due to very restricted distribution. **Vulnerable fauna** include Glossy Black-cockatoo, Greater Broad-nosed Bat, Eastern Little Mastiff-bat, Masked Owl, Powerful Owl, and Sooty Owl. Endangered population includes Gang Gang Cockatoo.
Nationally Significant Vegetation	**Threatened Ecological Community** • Shale/Sandstone Transition Forest (Endangered) **Critically Endangered Ecological Communities** • Turpentine Ironbark Forest • Blue Gum High Forest
Nationally Sign.Fauna	Spotted-Tail Quoll, Swift Parrot, Regent Honeyeater
Environmental Weeds	Small-leaved Privet, Large-leaved Privet, Wandering Jew, Ochna
Major Threats to Native Vegetation	Urban development; bushfire management especially APZs; land clearing, weed invasion; expansion pressure on bushland versus agricultural land; stormwater pollution, predation by cats, loss of urban trees with hollows, mowing in parks.

Table 3: Snapshot of biodiversity associated with sandy, infertile soils derived from Hawkesbury Sandstone

Geology	Hawkesbury Sandstone
Description	Hawkesbury Sandstone outcrops extensively on the Hornsby Plateau, overlying the Narrabeen Group consisting of medium to coarse-grained quartz sandstone with minor shale and laminite lenses.
Vegetation of State Conservation Significance	**Endangered Ecological Communities on Hawkesbury Sandstone with Shale Lenses** • Duffys Forest *Corymbia gummifera, A. costata, S. glomulifera, E. piperita, E. pilularis, E. sparsifolia, E.punctata, E. globoidea, E. acmenoides* Open Forest (Community DF) and • Shale/ Sandstone Transition Forest *E. punctata, E. eugenioides, C. gummifera, A. costata* Open Forest (Community SS) **Species** *Acacia bynoeana, Acacia gordonii, Callistemon linearifolius, Darwinia peduncularis, Darwinia procera*, *Eucalyptus* sp. Cattai, *Genoplesium baueri, Hibbertia nitida, Wahlenbergia multicaulis*
Vegetation of Regional Conservation Significance	**Communities** • Narrow-leaved Apple Gully Forest *E. piperita, A. bakeri* Open Forest (Community B) • Rock Platform Heath *Acacia suaveolens, A. hispida, Baeckia brevifolia, B. diosmifolia, B. ericifolia, Dillwynia floribunda, Epacris microphylla, Kunzea ambigua, Leptospermum squarrosum, L. trinervium etc.* Open Heath or Closed Heath (Community H) • Sandstone Swamp *Baeckia imbricata, Banksia ericifolia, B. oblongifolia, Callistemon citrinus, Hakea teretifolia, Lepidosperma filiforme, Leptospermum squarrosum, Schoenus brevifolius, Viminaria juncea, Xanthorrhoea resinifera* Closed-sedgeland or closed-heath (Community I) • Warm Temperate (Coachwood) Rainforest (Community O) **Species** *Boronia serrulata, Darwinia fascicularis* ssp*. oligantha,*
Pre-settlement vegetation	Large areas of the Hornsby Plateau including Coba & Fagan Ridges, Muogamarra Nature Reserve & Ku-ring-gai Chase National Park, Cowan Creek & upper reaches of the Lane Cove Valley, Arcadia and Berrilee, Berowra Heights & Fiddletown
Post-settlement vegetation	Large areas of Hawkesbury Sandstone vegetation remain and are conserved in national parks, regional parks and nature reserves with the less steep sites developed for a range of rural pursuits and urban housing.

Blackbutt on Hawkesbury Sandstone

Land Use	Cleared areas include market gardens, citrus orchards, plant nurseries, horse studs, grazing land, hobby farms, quarries and urban residential areas. Uncleared areas are present in national and regional parks and nature reserves. Activities include bushwalking, horse and trail bike riding, bushfire mitigation and off-road vehicles.
Waterways	Deeply dissected sandstone areas are located in the upper and middle slopes of Lane Cove River, Cowan Creek and Berowra Creek catchments.
Public Land	Berowra Valley Regional Park, Marramarra, Ku-ring-gai Chase & Lane Cove National Parks and Muogamarra Nature Reserve.
Conservation Status	Hawkesbury Sandstone vegetation represents the richest assemblage of xeromorphic species in eastern Australia; a remnant once spanning the south of the continent. **Duffys Forest (Community DF) –** Endangered Ecological Community (State) **Shale/ Sandstone Transition Forest (Community SS) –** Endangered Ecological Community (State and National) **Narrow-leaved Apple Gully Forest (Community B)** – Not known from any major reserve, appears restricted to upper Colah Creek. Regionally significant. **Rock Platform Heath (Community H)** – Small patches occur on suitable outcrops of Hawkesbury Sandstone. Regionally significant due to rare plants associated esp. *Kunzea rupestris, Micromyrtus blakelyi, Darwinia biflora & Darwinia peduncularis* **Sandstone Swamp (Community I)** – Only few mappable areas detected but occurs more extensively further east in Ku-ring-gai Chase NP but limited in extenet. Identified by DEC as regionally significant. **Warm Temperate Coachwood Rainforest (Community O) –** Poorly conserved in Sydney Region. **Silvertop Ash-Scribbly Gum Woodland (Community E)** – occurs on flatter ridgetops and is being cleared for development. Locally significant. **Blackbutt Gully Forest (Community L)** – associated mainly with gullies, is less affected by clearing and is now the most extensive of the taller forest communities in Hornsby Shire. Small areas are within Ku-ring-gai Chase NP and Berowra Valley RP. The largest areas present are outside the major reserves. Locally significant. **Angophora Woodland** (**Community S)** – Restricted distribution to steep slopes near Hawkesbury River near Fishermans Point. Locally significant. **Vulnerable fauna** includes Adams Emerald Dragonfly, Barking Owl, Eastern Little Mastiff-bat, Great Pipistrelle, Large Bent-wing Bat Heath Monitor, Koala, Large-footed Myotis, Masked Owl, Powerful Owl, Red-crowned Toadlet, Sooty Owl, Turquoise Parrot, Yellow-bellied Glider, Yellow-bellied Sheathtail Bat, Eastern Pygmy-Possum
Nationally Significant Vegetation	*Shale /Sandstone Transition Forest – endangered ecological community* *Acacia gordonii, Caladenia tesselata, Darwinia biflora, Eucalyptus camfieldii, Grevillea parviflora* subsp*.supplicans, Kunzea rupestris, Lasiopetalum joyceae, Leptospermum deanei, Melaleuca deanei, Micromyrtus blakelyi, Olearia cordata, Persoonia hirsuta, Persoonia mollis* subsp*. maxima, Pimelea curviflora* var*. curviflora, Tetratheca glandulosa*
Nationally Significant Fauna	Giant Burrowing Frog, Southern Brown Bandicoot, Spotted-tailed Quoll.
Common Environmental Weeds	Lantana, Pampas Grass, Turkey Rhubarb, Cats Claw Creeper, Morning Glory, Madeira Vine, Genista
Major Threats to Native Vegetation	Track grading, illegal horse riding & trail bike riding, too cool or too frequent hazard reduction burning, loss of pollinators due to European Honeybee, clearing for rural residential development & fire trails, isolation of populations, urban runoff, weed invasion, grazing, altered drainage, sedimentation erosion, cut flower industry, rubbish dumping, encroachments,.

View of sandstone vegetatin and Berowra Creek

Table 4: Snapshot of Biodiversity Associated with Riverine Environments such as Holocene stream alluvium and estuarine sediments and Narrabeen Group Sediments

Geology	Holocene stream alluvium, marine & estuarine & Narrabeen Gp Sediments
Description	Holocene stream alluvium occurs as level to gently undulating floodplains draining Hawkesbury Sandstone and consists of deep podzols on well drained terraces, siliceous sands on floodplain and humus podzols in low lying areas. Quaternary marine sediments occur as level to gently undulating tidal flats regularly inundated by tidal waters. Narrabeen Group Sediments occur as rolling to very steep low hills of interbedded laminite and shale with quartz to lithic quartz sandstone.
Vegetation of State Conservation Significance	**Endangered Ecological Communities on Quaternary Alluvium and Marine Sediments** • River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions • Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions (Community V) • Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (Community U) • Coastal Saltmarsh (Community Y) **Threatened Species on Narrabeen Group Sediments** *Ancistrachne maidenii, Asterolasia elegans*
Pre-settlement vegetation	Vegetation occurred along the tidal reaches, floodplains and lower slopes of the Hawkesbury River and its tributaries including Wisemans Ferry, Laughtondale, Milsons Passage, Bar Island, Dangar Island, Berowra Creek.
Post-settlement vegetation	Mangroves remaining, saltmarsh areas are often grazed, river terraces and side slopes are partially cleared tall open woodland, weed infested tall open forest and closed forest.
Land Use	Orchards, grazing, hobby farms, rural residential, river settlements.
Waterways	Hawkesbury River, lower reaches of Berowra Creek, Marramarra Creek and Cowan Creek.
Public Land	Long Island, Milson Island and Spectacle Island Nature Reserves, Bar Island
Conservation Status	**River-flat Eucalypt Forest on Coastal Floodplains (Community P)** – Small examples near Crosslands. Endangered Ecological Community. **Swamp Oak Floodplain Forest (Community V)** Occurs on marine sediments**.** Has been affected by extensive clearing of the floodplain. Endangered Ecological Community **Swamp Sclerophyll Forest (Community SF1, SF2, SF3)- includes Swamp Mahogany Forest, Floodplain Paperbark Scrub and Floodplain Reedland -**Small examples at Brooklyn, Singleton Mill and Gentlemans Halt (under 5 ha**).** Endangered Ecological Community. **Coastal Saltmarsh (Community Y)** Endangered Ecological Community **Grey Myrtle Rainforest (Community O2) –** uncommon community in the Sydney Region. DEC has recognised it as a regionally significant community. **Rough-barked Apple-Forest Oak Forest (Community Q1)** – Recognised as regionally significant by DEC. **Blackbutt-Rough-barked Apple Forest (Community Q2)** - Recognised as a regionally significant community by DEC – found at Dangar Island. **Narrow-leaved Apple Slopes Forest (Community R).** Restricted distribution along northern reaches of the River upstream of Gentlemans Halt. Regionally significant. **Mangroves (Community W)** Occurs on marine sediments. Intertidal vegetation along Hawkesbury River, Marramarra and Berowra Creek to Wisemans Ferry. Important habitat. Locally significant. **Vulnerable fauna** includes Black Bittern
Nationally Significant Vegetation	*Haloragis exalata* subsp*. exalata, Zieria involucrata*
Nationally Significant Fauna	Osprey, Spotted-tail Quoll
Common Environmental Weeds	Lantana, Morning glory, Balloon Vine, Crofton Weed, Mother of Millions

Major Threats to Native Vegetation	Weed invasion, clearing, dumping, weed spraying, too cool or too frequent fire, track maintenance widening and trampling, small size of populations, increased flood peaks due to urbanisation, polluted runoff, septic tanks, rubbish dumping, sedimentation, erosion.

Bar Island Chimney and native vegetation

6.7 Aquatic Habitats, Species and Protected Areas

In Berowra Creek estuary the mangrove biota, macrofauna in subtidal sediments and fish and mobile invertebrates in seagrass beds and deep holes have been studied. Also for the Brooklyn estuary, the mangrove benthic macrofauna, the riparian and aquatic flora and fauna, habitats, intertidal macrofauna and flora, fish and macroinvertebrates have been assessed.

Saltmarsh, Mangroves and Seagrasses

Coastal saltmarsh has been listed by the NSW Scientific Committee as an Endangered Ecological Community in the NSW North Coast, Sydney Basin and South-East Bioregions. In Berowra and Marramarra Creeks, decreases in saltmarsh have occurred (8ha, 38%) between 1941 and 1992 and there has been a substantial increase in mangroves (45ha, 30%) (Williams and Watford, 1997). The mangrove increase has been both landward and seaward.

The most significant remaining saltmarsh sites are in Big Bay, Marramarra Creek and Calna Creek. Small stands of saltmarsh exist on both banks in Sandbrook Inlet near Brooklyn. The saltmarsh species include the samphire, *Sarcocornia quinqueflora*, rushes such as *Juncus krausii* and the Swamp She-oak *Casuarina glauca.* They are important as habitat for juvenile fish, crabs and as egg laying sites for fish such as Galaxias. They appear to be threatened by sea level rise, sediment issues and expansion of mangroves, and in developed areas, clearing and filling for landuse intensification.

Mangroves are important habitats for fish, crabs, birds, insects, spiders and other animals. Mangrove trees provide large amounts of organic matter, which is eaten by smaller aquatic animals. Mangroves of Berowra Creek estuary feature six species of snail, bivalve molluscs and marine slaters. Big Bay has more abundant and diverse mangrove fauna than other sites in the estuary. Big Bay has been recognised as being a significant area for conservation and has been recommended for incorporation into Marramarra National Park or dedicated as an aquatic reserve.

Mangrove forests are abundant near Brooklyn and have increased over the last 15 years. Mangrove stands at Mooney Mooney Point have significantly increased in size, which can be attributed to linear expansion of single trees along watercourses or marginal expansion of existing stands through trapping of sedimentation.

The leaf biomass for common grey mangroves in the Hawkesbury River of 40 kg/m^2 is the highest recorded for temperate forest communities.

Seagrass beds form significant nursery, feeding and shelter habitat for fish, molluscs and crustaceans. Seagrass beds are present at a number of locations including Sandbrook Inlet, Brooklyn Harbour, Dangar Island and the head of Mullet Creek. The dominant seagrass is Eelgrass *(Zostera capricorni*) and the cover of seagrasses has increased over the 16 years of available data. The seagrass bed in Brooklyn Harbour appeared healthy with a low epiphyte load (The Ecology Lab 2003).

Invertebrates in muddy subtidal sediments

Muddy sediments in shallow (1-2m) and deep (>10m) areas of Berowra Creek feature polychaete worms, amphipods, isopods, crabs, shrimps and molluscs. Different fauna groups occur in deep holes from those in shallow muddy habitats. Again, different fauna groups occur in the

holes in the lower more saline section of the creek (closer to the Hawkesbury River) to those found in the middle section of the creek.

Overall, the deep holes form habitat that supports a relatively diverse and abundant invertebrate fauna and may fulfil an important ecological function as a refuge for macroinvertebrates. Deep holes as a habitat of importance can have a large variation in the abundance of benthic invertebrates, which may be related to variations in water quality, particularly to periodic low dissolved oxygen levels found at the bottom of the holes.

Invertebrates in sandy subtidal sediments

Invertebrates living in shallow (<2m) sandy sediments near Calna Creek in the Berowra Creek estuary include molluscs (mainly a small pipi-like bivalve *Sanguineolaria donacoides)*, polychaete worms and crustacean amphipods. More molluscs and crustaceans occur in middle and upper creek sediments and more polychaetes in the lower sections of the creek. The dominant species in sediments near Calabash Bay is the bivalve, *S. donacoides,* probably due to the generally higher levels of phyto- and zooplankton in this part of the creek, which may provide it with food in the form of detritus.

Fish, Prawns and Crabs

Fish, prawns and crabs in seagrass beds of Berowra Creek were examined and large numbers (17,854) found - 29 species of fish, 5 species of crustaceans and 1 species of mollusc. Flat-headed gudgeons occur in the upper creek and large numbers of Tamar River gobies in the lower creek. The large variations in the groups of fish in different seagrass beds is consistent with the idea that the distance of the seagrass bed from the mouth of the estuary (i.e. salinity) has a great influence on the fish species present.

Two deep holes near Calabash Bay were examined in the lower creek and two in the middle section. A total of 63 animals of 14 different species were found, the most common fish being the large-tooth flounder, flat tail mullet and silver biddy. Similar groups and numbers of fish were found in shallow and deep locations. The data on benthic invertebrates in deep holes suggests that in addition to providing a refuge from changes to their physical environment, fish would also have food to eat while in deep holes.

The fish, prawns and crabs found in Sandbrook Inlet and Brooklyn Harbour were similar to other parts of the estuary. Gobies were the most abundant fish, while shrimps were the most abundant

invertebrate. Fish of economic importance collected in the Brooklyn area include mullet, bream, whiting, tailor, flounder, leatherjackets, mulloway and sandy sprat. Prawns of economic importance include eastern king prawn, school prawn, greasyback prawns and king prawns.

Freshwater Surveys

Hornsby Shire Council's water quality monitoring program has been in progress since October 1994. In 2000, 230 taxa from 103 macroinvertebrate families were investigated. Highest diversity was found in the bushland catchments at Tunks Creek, Calna Creek, Berowra Creek at Galston Gorge and Still Creek, where there was a good selection of habitat. Sites from similar catchments showed similar macroinvertebrate communities. Eight native fish species were found, with sensitive species such as Galaxiids in more pristine sites, and two exotic species in the more polluted creeks (carp and mosquito fish).

Catastrophic events cause a large loss of flora and fauna through toxic , smothering or physical impacts. Recovery is often possible, however, more continuous pollution discharges effectively modify the stream ecology, altering it to a simpler community tolerant of pollution.

Currently spring and autumn rapid assessments of stream health are carried out using aquatic invertebrates and algae as indicators. Sites are representative of the major catchment and landuse types or are located to address specific water quality issues. Results are used to identify trends in water quality. A by-product of these surveys is a list of species for the sampled sites, although there are no comprehensive inventories of aquatic biodiversity.

The first year of rapid assessment results were completed (AMBS 2002). Eighteen sites along creeks were located downstream of various land use types including urban, rural, rural/urban and industrial. Macroinvertebrate and diatom sampling, in situ water quality readings, and habitat assessments were undertaken at each site.

Over one hundred taxa of macroinvertebrates were collected, the most common in spring being the Chironomidae non-biting midges 18%, Hydrobiidae snails 17%, mayflies 7% and the Culicidae mosquito larvae 6%. The most common in autumn were the Hydrobiidae snails 26%, the Chironimidae non-biting midges 18%, the Physidae snails 10% and the Oligochaeta segmented worms 5%.

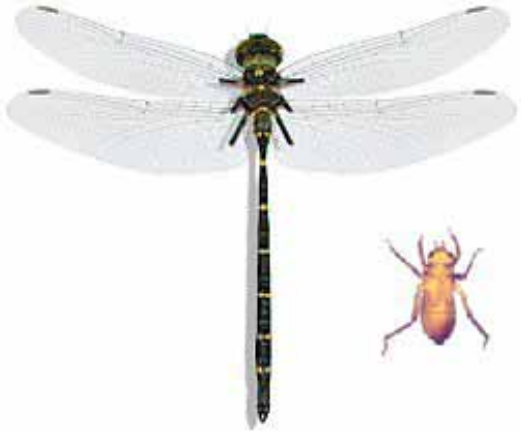
A total of 184 diatom species were recorded in spring 2002 (180 species, 49 genera) and autumn 2003 (184 species, 50 genera) samples. The most common species were *Achnanthidium minutissimum, Nitzschia inconspicua, Gomphonema parvulum, Achnanthes oblongella, Navicula cryptocephala, Navicula gregaria, Nitzschia palea, Eolimna minima* and *Navicula veneta*.

The habitat assessments indicated that while creeks generally provided habitat considered suitable for macroinvertebrates and diatoms, most of the sites were experiencing various levels of disturbance to water quality and riparian zones. Generally community diversity varied according to the predominant land use above each site. Communities at industrial and highly impacted urban sites were characterised by low species diversity, whereas communities at rural sites were highly diverse.

The program to date indicates that the creeks in the catchment appear to be influenced by general land use patterns at a catchment level, as opposed to direct upstream or adjacent landuses. The ongoing nature of this program will allow for trends to be further analysed with more data in consultation with Council. This will ensure the outcomes of the program delivered to Council are useful in catchment management decision-making

Protected Areas

The only estuarine area currently formally protected as a reserve in the Hornsby Shire is the part of Cowan Creek that falls within Ku-ring-gai Chase National Park, except for small parts of Berowra Creek that fall within Muogamarra Nature Reserve. On the whole, intertidal, subtidal and freshwater aquatic communities are poorly represented in the major reserves, as their boundaries are generally located at mean high water mark level. Of particular significance is the Big Bay area near Marramarra National Park and the habitat of threatened Adams Emerald Dragonfly, which although occurring within Berowra Valley Regional Park, has no other protection.



Adams Emerald Dragonfly, courtesy NSW Fisheries

7.0 Threats to Biodiversity

Biodiversity in Hornsby Shire is impacted upon by a range of threats, listed below:

- **Vegetation clearing** resulting in habitat destruction
- **Widespread and pervasive threats** such as exotic weeds, predation and grazing by feral animals and bush fire management activities such as clearing, too frequent and/or too cool fires, stormwater and septic pollution, sedimentation and erosion, altered water flows and creekline morphology.
- **Expansion of urban development** into bushland resulting in fragmentation of remnants, loss of tree hollows, mowing of understorey, damage to bushland from encroachments, rubbish dumping and trail bikes.
- **A general lack of interest, awareness and understanding** of the values and importance of biodiversity.
- **Overharvesting** of marine species or water resources.
- **Impacts of climate change** from greenhouse gas emissions on the loss of key habitats such as saltmarsh, future pathogens, new weed species, other introduced organisms and other as yet unknown effects will potentially have substantial impacts.

Key Threatening Processes listed by the NSW Scientific Committee and Threat Abatement Plans prepared are detailed in Appendices 7-9. The Annual Biodiversity Action Plan will incorporate key actions to implement threat abatement in the Hornsby Shire.

Pelican, Brooklyn

8.0 Implementation of the Strategy

8.1 Corporate Planning

An annual Biodiversity Conservation Action Plan will be prepared, which will set targets and a timeframe for the implementation of priority and supporting actions. These actions will be included in Council's annual Principal Activity Service Plan and Management Plan.

8.2 Monitoring, Reporting and Feedback

Evaluation and monitoring of the annual Biodiversity Action Plan will be included in relevant annual reports such as the State of the Environment Report and Bushland Management Report. New priorities that arise will be included into future Council Service and Management Plans. A Biodiversity Committee of stakeholders will be formed and will play a key role in implementing and monitoring the Action Plan.

8.3 Funding

Funding is to be sourced from a number of areas including:

- Council funds including rates and levies such as the Catchment Remediation Rate,
- grants,
- Section 94 contributions,
- development trade-offs,
- through a revolving fund from the sale of Council assets which have low conservation value to allow purchase and restoration/ regeneration of high biodiversity conservation value land,
- sponsorships,
- Bush Heritage Fund donations, and
- donations by charitable trusts, corporations and individuals.

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Biodiversity Conservation Strategy

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HORNSBY SHIRE COUNCIL

Biodiversity Conservation Strategy

GLOSSARY

10.0 Glossary

A

algal blooms
: sudden proliferation of microscopic algae in water bodies, stimulated by the input of nutrients such as phosphates

aquatic
: living in or on water for all or a substantial part of the life span (generally restricted to fresh/inland waters).

atmosphere
: composite layer of colourless, odourless gases, known as air, surrounding the Earth; it shows distinct vertical zonation

B

benthic
: associated with aquatic or sea floor

biodiversity
: the variability among living organisms from all sources (including terrestrial, marine and other ecosystems and ecological complexes of which they are part) and includes: diversity within species and between species; and diversity of ecosystems

biogeochemical cycles
: the movement of chemical elements between organisms and non-living compartments of atmosphere, aquatic systems and soils

biological control
: controlling a pest by the use of its natural enemies

biological productivity
: the intensity of life form production in an ecosystem or part of an ecosystem

biomass
: the quantity of organic matter within an ecosystem (usually expressed as dry weight for unit area or volume)

bioregion
: a territory defined by a combination of biological, social and geographical criteria rather than by geopolitical considerations; generally, a system of related, interconnected ecosystems

biota
: all of the organisms at a particular locality

bushfire
: a term used to describe almost any form of fire burning out of control whether the fire was planned or unplanned

bushfire hazard reduction
: a reduction or modification of material that constitutes a bushfire hazard by burning or manual methods

bushfire regime
: the intensity, fequency, seasonality and area of fire in area

bushland
: 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

bycatch
: species taken incidentally in a fishery where other species are the target; may be of lesser value than the target species and are often discarded

C

canopy
: the branches and foliage of a tree

carbon sequestration
: the capture of carbon, particularly uptake and storage in woody biomass and soils

catchment
: the area determined by topographic features within which rainfall will contribute to run-off at a particular point under consideration

classification system
: the systematic grouping of entities into categories based upon shared characteristics

clearing
: removing vegetation, particularly trees and shrubs, from a landscape, often with the intention of replacing it with plants regarded to be more directly useful to humans

climate
: the synthesis of the day-to-day weather conditions in a given area; the actual climate is characterised by long-term statistics of the state of the atmosphere in an area

climate change
: under the terms of the UNFCCC, the term means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is, in addition to natural climate variability, observed over comparable time periods

climate variability
: the natural year-to-year and season-to-season variation of the climate system

community
: a natural aggregate of different species of organisms existing in the same environment. While species within the community interact with each other, forming food chains and other ecological systems, they do not generally interact with species in other communities

community participation
: procedures whereby members of a community participate directly in decision-making about developments that may affect the community

comprehensiveness
: the degree to which the full range of ecological communities and their biodiversity are incorporated within reserves

Comprehensive, Adequate and Representative Reserve System (CAR)
: a reserve system to conserve all native forest types as well as the plants and animals that depend on them: comprehensive, the full range of forest communities recognised by an agreed national scientific classification at appropriate hierarchical levels; adequate, the maintenance of the ecological viability and integrity of populations, species and communities; representative, those sample areas of the forest that are selected for inclusion in reserves which should reasonably reflect the biodiversity of the communities

condition indicator
: something that describes the quality of the environment and the quality and quantity of natural resources; highlights changes in environmental conditions over time

connectivity
: the degree of interconnection of habitat or habitats

conservation
: the protection, maintenance, management, sustainable use, restoration and enhancement of the natural environment

conserved vegetation
: those communities where adequate areas are found within the reserve system of national or regional parks, nature reserves and Council bushland reserves

cover
: the cover produced by the foliage of any vegetation within a defined area

critical habitat
: as defined in the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994

D

database
: a collection of interrelated information, usually stored on some form of storage system. A geographic information system database includes data about the position and attributes of geographical features that have been coded as points, lines, areas, pixels or grid cells

data compilation
: the process of bringing data together from a range of sources for validation, analysis and reporting

data management
: maintenance and updating of data and information including access and confidentiality, conformity and quality and content

data set
: a unique and defined data set often developed using similar methods

data quality
: the characteristics of a data set including its source, purpose and method of collection and analysis techniques used that can be used to assess its 'quality' for a particular application

discharge
: the volume of water that flows through a cross-section of a stream

domestic animals
: animals directly managed by humans

dominant
: a common species that is always dominant in the sub-association; it is very frequent and also has the greatest biomass; any number of species could be dominant (e.g. 1, 2, 3, 4 or 5) depending on the association

dominant stratum
: the most important or characteristic stratum of a particular vegetation type, which dominates the rest of the community in the sense that it conditions the habitats of the other strata

drainage
: the interception and/or removal of surface and/or ground water from a given area by natural or artificial means

E

ecological dominance, ecologically predominant, foremost, diagnostic, indicator
: ecological dominance is defined as the species making the greatest contribution to the overall biomass of the stratum, site and vegetation type

ecological footprint
: the ecological effect of cities, including the direct local effects and the indirect regional and global effects due to the resources they use and the wastes they produce

ecological processes
: processes that have an essential part in maintaining ecosystems; four fundamental ecological processes are the cycling of water, the cycling of nutrients, the flow of energy and biodiversity

ecological sustainability
: the capacity of ecosystems to maintain their essential processes and functions and to retain their biodiversity without impoverishment

ecologically sustainable development (ESD)
: using, conserving and enhancing 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

ecology
: the scientific study of living organisms and their relationships to one another and their environment

ecosystem
: a dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit

ecotone
: the transitional area between two vegetation types

edaphic
: characteristics of soil or topography

ecosystem integrity
: the degree to which the fundamental ecological processes (e.g. water and nutrient cycling, the flow of energy and biodiversity) are maintained

ecosystem services
: the role played by organisms in creating a healthy environment for human beings, from production of oxygen to soil formation and maintenance of water quality

ecotourism
: nature-based tourism that involves education and interpretation of the natural environment and is managed to be ecologically sustainable

El Niño
: an extensive warming of the central and eastern Pacific that leads to a major shift in weather patterns across the Pacific; in Australia (particularly eastern Australia), El Niño events are associated with an increased probability of drier conditions

emissions
: substances such as gases, or particles discharged into the atmosphere as a result of natural processes or human activities, including those from chimneys, elevated point sources and tailpipes of motor vehicles

endangered species
: a species which is in danger of extinction and whose survival is unlikely if the causal factors continue; included are species whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that the species are deemed to be in danger of extinction

endemic
: native to a particular area and found nowhere else

ENSO (El Niño-Southern Oscillation)
: a suite of events that occur at the time of an El Niño; at one extreme of the cycle, when the central Pacific Ocean is warm and the atmospheric pressure over Australia is relatively high, the ENSO causes drought conditions over eastern Australia

environment includes
: (a) ecosystems and their constituent parts, including people and communities;
(b) natural and physical resources;
(c) the qualities and characteristics of locations, places and areas; and
(d) the social, economic and cultural aspects mentioned in (a), (b) or (c)

environmental weed
: a plant that spreads and invades native vegetation

environmental indicators
: measures of physical, chemical, biological, social, cultural or economic factors which best represent the key elements of complex ecosystems or environmental issues

environmental management
: effective and active measures taken for the protection, conservation and presentation of the environment, heritage and natural resources for which a government, organisation or individual is responsible

environmental stress
: the damaging influence of human activities on the environment (e.g. through pollution or consumption of natural resources) or that generated by natural events such as storms or droughts

ephemeral
: organisms that have a short life-span, or a watercourse that does not flow all the time

erosion
: the continuing process of landscape development as a smoothing or levelling of the earth's surface by removal of weathered material; natural erosion is due only to the forces of nature; accelerated erosion occurs as a result of human activities; in each case the same processes operate and the distinction is often only a matter of degree and rate.

estuary
: area of an inlet or river mouth that is influenced by the tides and also by fresh water from the land; area where fresh and salt waters mix

eutrophication
: process by which waters become enriched with nutrients, primarily nitrogen and phosphorus, which stimulate the growth of aquatic flora and/or fauna

ex situ conservation
: conservation of species outside their natural habitat (e.g. in zoos, botanical gardens and seed banks)

exotic species
: a species occurring in an area outside its historically known natural range as a result of intentional or accidental dispersal by human activities (including exotic organisms, GMOs and translocated species)

F

family
: in the hierarchical classification of organisms, a group of species of common descent higher than the genus and lower than the order, hence a group of genera

fauna
: the entire animal life of a site or region

feral animal
: an animal that has reverted to a wild state from domestication (e.g. feral cats, pigs, donkeys)

fire regime
: the pattern of fires at a location; includes the frequency, intensity and seasonality of the fires

flora
: the entire plant life of a site or region

floristics
: a description of the plant species that occur in a defined area or vegetation type

fragmentation
: the result of broad scale clearing of native vegetation and the small parts of that vegetation that remain often only as isolated patches

freehold tenure
: land owned privately

G

gene
: the functional unit of heredity; that part of the DNA molecule that encodes a single enzyme or structural protein unit

genetic material
: any material of plant, animal, microbial or other origin that contains functional units of heredity

genetically modified organisms (GMOs)
: organisms whose genetic make up has been altered by the insertion or deletion of small fragments of DNA in order to create or enhance desirable characteristics from the same or another species

genome
: all the genes of a particular organism or species

genus
: the collective name of a group of species possessing certain common characteristics by which they are distinguished from all other genera

geographic information system (GIS)
: a package of computer programs specifically designed to deal with data that are spatially related; a set of tools for collecting, storing, retrieving, manipulating, analysing and displaying mapped data from the real world

Gondwana
: the southern supercontinent that started to break up about 150 million years ago, consisting of what are now South America, Africa, Antarctica, Arabia, Australia, India, Madagascar and New Zealand

grassland
: areas dominated by grasses and with few or no trees

greenhouse gas emissions
: gases including carbon dioxide, methane, nitrous oxide, carbon monoxide, oxides of nitrogen, non-methane volatile organic compounds (NMVOCs), perfluorocarbons and sulfur hexafluoride emitted from particular land uses including land clearing, the energy sector, agricultural activities and forestry.

ground water
: water occurring below the ground surface

growth-form
: habit or form of a plant

H

habitat
: an area or place (a) occupied (continuously, periodically or occasionally) by an organism or group of organisms; or (b) once occupied (continuously, periodially or occasionally) by an organism, or group of organisms, and into which organisms of that kind have the potential to be reintroduced

heathland
: vegetation dominated by small shrubs with small hard leaves

hectare (ha)
: 10 000 square metres

height
: measurement from base to top for a given plant community to derive the average height for a given stratum

herb
: any vascular plant that never produces a woody stem

herbivore
: an animal that consumes plants

heritage
: those places, objects and Indigenous languages that have aesthetic, historic, scientific or social significance or other special value for future generations as well as for the community today

hummock grass
: spinifex grasses usually growing together as large rounded 'hummocks' which can be several metres across, often forming rings with a central dead or decaying patch; hummock grasslands are largely confined to the arid interior and to infertile soils

hybrid
: the offspring of two animals or plants of different varieties, species or genera

hydrocarbon
: an organic compound containing hydrogen and carbon; the major components of petroleum

I

indicator species
: a species whose presence or absence is indicative of a particular habitat, community or set of environmental conditions

Indigenous people
: the Aboriginal and Torres Strait Islander peoples of Australia

in situ
: the location of biological, physical or material culture objects in their original physical and cultural context

***in situ* conservation**
: conserving species within their natural habitat

intellectual property
: intellectual property represents the property of your mind or intellect. This includes information people have as part of their cultural heritage (e.g. knowledge about bush foods or oral history)

intertidal
: between the levels of low and high tide; the intertidal zone is often called the littoral zone in Australia

introduced species
: see exotic species

invertebrate
: an animal without a backbone composed of vertebrae; examples include insects, worms, snails, mussels, prawns and cuttlefish

JK

L

land cover
: the physical state of the land surface, including vegetation, soil, rock and human-made structures

landcare
: any policy, strategy or practice furthering sustainable land management. Landcare is practised by community groups, formal support services, advisers, land managers and individuals. The community component of Landcare aims to encourage community groups and landholders to identify and solve the soil, water, vegetation, management and nature conservation problems in their area. Grants help groups with planning, education and training, resource inventories and monitoring .

landscape condition
: a value judgement related to the worth of a landscape for a particular land use. Condition is not necessarily equivalent to function. This judgement may depend on the presence of species considered important for a particular land use and may be influenced by cultural or social views or values.

landscape function
: the ability of a landscape to conserve and use scarce water and nutrients.

leasehold
: land owned by governments on behalf of the people they represent but leased to specified people or organisations for a specific purpose; about 50% of Australia, mostly in the drier regions, comes under some form of leasehold; governments retain a variety of controls over how leasehold land is used.

lignotuber
: a woody swelling below or just above the ground, containing adventitious buds from which new shoots develop if the top of the plant is cut or burnt (common in the shrubby eucalypts and in many other fire-tolerant Australian shrubs)

littoral
: of, or pertaining to, a shore, especially a sea shore; littoral zone - the specific zone of the sea floor lying between high and low tide levels (intertidal)

M

major vegetation groups
: major structural formations (e.g. woodlands, grasslands) and floristic groups (e.g. acacias and eucalypts) that broadly group Australia's native vegetation

mesophyll
: photosynthetic tissue of a green plant; of vegetation, characteristic of moist habitats and with soft, fairly large leaves predominating; a leaf whose area is within the approximate range 20<180 square cm

mangrove
: a plant (belonging to any of a wide range of species, mainly trees and shrubs) that grows in sediment regularly inundated by seawater; a community (forest, woodland, shrubland) of such plants

mapping methods
: information about the mapping sources and base data used to delineate the map/spatial units in a data set. Each data set may be compiled using a combination of mapping methods and sources of information

migratory fauna
: fauna that move from one location to another then return to the same location on a seasonal or annual basis

monitoring
: routine counting, testing or measuring of environmental factors or biota to determine their status or condition

monoculture
: the cultivation of a single species, usually a single crop on land

mosaic
: a set of vegetation descriptions describing a map unit. This accounts for the heterogeneous nature of vegetation in a continuum.

mycorrhiza
: a symbiotic union between a fungus and a plant root

N

native forest
: any local indigenous forest community containing the full complement of native species and habitats normally associated with that community, or having the potential to develop these characteristics

native (indigenous species)
: species that are native to (i.e. occur naturally) in a region

native plantings
: planting of native Australian plant species for a range of outcomes including farm forestry, biodiversity conservation, mitigating dryland salinity etc

native regrowth
: natural regrowth of native Australian plant species in an area that has previously been cleared

natural resources management
: the management of natural resources (e.g. land, water and biodiversity) in an integrated fashion recognising the values of both conservation and productive use of natural resources and striving to achieve sustainability in all resource use

native vegetation
: any local indigenous plant community containing throughout its growth the complement of native species and habitats normally associated with that vegetation type or having the potential to develop these characteristics. It includes vegetation with these characteristics that has been regenerated with human assistance following disturbance. It excludes plantations and vegetation that has been established for commercial purposes

natural environment
: an environment that is not the result of human activity or intervention

nomadic fauna
: species that move widely in response to the avialbility of resources, such as food or nesting sites, but do not necessarily return to the same location on a regular basis

noxious weed
: a plant declared to be a noxious weed within the Hornsby Shire under the Noxious Weeds Act 1993

O

objectives
: broad policy goals, which are not precisely quantified (e.g. sustainable resource management)

old growth
: ecologically mature vegetation that has been subject to negligible levels of disturbance such as logging, roading and clearing

organochlorine
: a hydrocarbon compound containing chlorine. Includes many pesticides and industrial chemicals

ozone
: a gas with molecules comprising three atoms of oxygen; in the stratosphere it occurs naturally and provides a protective layer shielding the earth from ultraviolet radiation; in the troposphere, it is can also be formed from anthropogenic emissions and is a major component of photochemical smog; ozone is also a greenhouse gas

P

pathogen
: a disease-causing agent

percentage cover
: the cover of any vegetation converted to a percentage for a given area

perennial
: plants that live for more than one year; or in relation to streams, one in which flows are lasting or continuous during the year

periurban
: low density housing and road development on the periphery of urban areas, still retaining small areas of rural land within networks of suburban building

pest
: an animal, or sometimes a plant, occurring where it is not wanted by humans

phytoplankton
: small plants that are suspended in water and free-drifting

plantations
: intensively managed stands of either native or exotic trees species, created by the regular placement of seedlings or seed

point source pollution
: pollution from an easily discernible, single source such as a factory

pollination
: the transfer of pollen from the male organ, where it is formed, to the receptive region of a female organ, e.g. from anther to stigma

pollution
: the direct or indirect alteration of the physical, thermal, biological or radioactive properties of any part of the environment in such a way as to create a hazard or potential hazard to the health, safety or welfare of any living species

polychlorinated biphenyls (PCBs)
: a group of chlorinated organic compounds that are non-corroding and resistant to heat and biological degradation; used as insulation in electrical equipment; can accumulate in some species and disrupt reproduction

poorly conserved vegetation
: those communities which have an inadequate area inside the protected area system and require additional protectioncover

population
: a group of individuals of the same species, forming a breeding unit and sharing a habitat

pre-European/pre-clearing
: vegetation types and extent before European settlement in Australia

present native vegetation
: native vegetation existing in the landscape as represented by mapped data sets. The currency, scale, method of mapping affect the vegetation types represented

precautionary principle
: where 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

precipitation
: any form or all forms of liquid or solid water particles that fall from the atmosphere and reach the earth's surface; includes drizzle, rain, snow, snow pellets, ice crystals, ice pellets and hail

preservation
: maintaining the physical material of places or objects in their existing state and retarding deterioration

pressure indicators
: measures that can be used to describe both positive and negative pressures on the environment, including the quality and quantity of natural resources; such pressures can be caused by human inaction as well as action

productivity (biological)
: the rate of accumulation of organic material in an ecosystem

protected area
: a protected area is defined in Article 2 of the International Convention on biodiversity as a 'geographically defined area which is designated or regulated and managed to achieve specific conservation objectives'

protected fauna
: fauna of a species not listed in Schedule 11 of the National Parks and Wildlife Act 1974

protocol
: a formal arrangement defining procedures

propagule
: a structure with the capacity to give rise to a new plant, e.g. a seed, a spore, part of the vegetative body capable of independent growth if detached from the parent

protected area
: defined by the World Conservation Union (IUCN) formerly the International Union for the Conservation of Nature as an area of land or sea specially dedicated to the protection and maintenance of biodiversity and associated cultural resources and management through legal and/or other effective means

Q

R

rainforest
: a closed forest in areas of high precipitation with a large diversity of species forming a deep, densely interlacing canopy in which vines and ferns are often present

rare species
: a species considered to be unusual or naturally present in small numbers

recharge
: rainfall that moves through the soil, beyond the roots of plants, to replenish the aquifer

recovery plan
: as defined in the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994

regrowth
: native vegetation containing a substantial proportion of individuals that are in the younger growth phase and are actively growing in height and diameter. Regrowth vegetation may contain scattered individuals or small occurrences of ecologically mature, or old growth vegetation

rehabilitation
: the restoration or repair of a system to a former or original condition

representativeness
: the extent to which areas selected are capable of reflecting the known biodiversity and ecological patterns and processes of the ecological community or ecosystem concerned (in the context of the National Reserves System)

reserves
: areas such as National Parks and nature reserves which are subject to an established degree of protection from disturbance

response indicator
: an indicator that shows the extent to which society is responding to environmental changes and concerns; includes changes in attitude and

individual and collective actions aimed at mitigating, adapting to or reversing negative effects on the environment and reversing environmental damage already caused; also includes actions to improve the preservation and conservation of the environment

restoration

the restoration or reconstruction of native vegetation to its former species composition and condition

revegetation

the planting of native species in areas that have been cleared or highly modified. The mix of species may not be the same as originally occurring in that patch of vegetation.

riparian/riverine vegetation

frequenting river banks; growing by rivers or streams

run-off

the portion of precipitation not immediately absorbed into or detained upon the soil and which thus becomes a surface flow

S

saltmarsh

saltwater wetland occupied mainly by herbs and dwarf shrubs, characteristically able to tolerate extremes of environmental conditions, notably waterlogging and salinity

sclerophyll

species that have adapted to lengthy seasonal drought by producing tough leathery leaves to cut down moisture loss by transpiration

seagrass

flowering plant adapted to living wholly submerged in sea water; not true grasses, but many have a grass-like form

seaweed

macroalgae (not flowering plants) occurring in the sea; typical examples are kelps, Neptune's necklace and sea lettuce

sediment

solid material settled from suspension in the water; solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by water, air or ice and has come to rest on the land or sea floor

seed banks

the seed naturally available at a site; most of it is stored in the soil, but some may be in protective fruits such as banksia 'cones'

shrub

a woody plant less than 5 metres high, either without a distinct main axis, or with branches persisting on the main axis almost to its base

shrubland

an area dominated by short, multi-stemmed plants; a typical example is the chenopod shrublands but sometimes the 'mallee' is classified as a shrubland

siltation

deposition of sediments from water in channels and harbours etc.

sinks

processes or places that remove or store gases, solutes or solids in accumulating parts of the environment

species
: a group of plants, animals or microorganisms that have a high degree of similarity and generally can interbreed only among themselves to produce fertile offspring, so that they maintain their 'separateness' from other such groups

stakeholders
: groups, individuals or organisations who may be affected by a development proposal, whether or not their stake in the outcome is explicit

State of the Environment reporting
: a process that provides a scientific assessment of environmental conditions, focusing on the effects of human activities, their significance for the environment and societal responses to the identified trends

stock (in fisheries)
: a group of individuals of a species that can be regarded as an entity for management or assessment purposes; commonly a distinct local population; some species form a single stock, others several distinct stocks

stratum
: a layer in a community produced by the occurrence at approximately the same level of an aggregation of plants of the same habit

structural formation
: formation classes defined by growth form and crown separation (woody plants) or foliage cover (ground stratum), and qualified by height class; the vegetation structure for each stratum is defined by describing the vegetation in terms of the growth form, height and cover

structure
: the spatial arrangement of plants within a community (Beadle & Costin 1952)

suspended solids
: any solid substance present in water in an undissolved state, usually contributing directly to turbidity, see *sediment*

sustainability indicators
: selected and/or aggregated indicators for evaluating specific ESD (ecologically sustainable development) goals

sustainable
: referring to an activity that is able to be carried out without damaging the long-term health and integrity of natural and cultural environments

T

targets
: specified levels or ranges of measurable parameters that decision-makers have agreed they will try to achieve; targets are policy tools, but they may have a scientific base; targets may be associated with one or many indicators

taxon (pl. taxa)
: the named classification unit to which individuals or sets of species are assigned, such as kingdom, phyllum, class, order, family, genus and species

threat abatement plan
: as defined in the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994

threatened
: a species or community that is vulnerable, endangered or presumed extinct

threatening process
: a process that threatens, or may threaten, the survival, abundance or evolutionary development of a native species or ecological community

tree
: a woody plant at least 5 metres high, with a main axis the lower part of which is usually unbranched.

trend
: a general direction or tendency; an indication of change (or its absence) in a property or condition

U

Unconserved vegetation
: those communities that are not protected within any conservation reserve

V

vagrant
: a migratory bird found outside the normal range of its species, sometimes as a result of being lost during a storm

vegetation
: all plants within a specified area. It is usually considered generally and not taxonomically.

vascular plants
: a grouping of plants that includes ferns, the gymnosperms (e.g. pines) and flowering plants

vegetation type
: a community that has a floristically uniform structure and composition, often described by its dominant species

vegetation condition
: the current state of ecosystems compared to what would be considered pristine or as defined by a set benchmark

vegetation description
: a vegetation description based on a mapped unit of vegetation

vertebrate
: an animal with a backbone composed of vertebrae (e.g. mammals, fishes, frogs, amphibians, reptiles and birds)

viability
: the likelihood of long-term survival of the example/population of a particular ecosystem or species

vulnerable species
: species which may soon move into the 'endangered' category if causal factors affecting their numbers continue. Included are species of which all, or most, populations are decreasing because of overexploitation, extensive destruction of habitat; species which are seriously depleted; under threat from severe adverse factors throughout their range; and species with low or localised populations and dependent upon a limited habitat which would be vulnerable to further threats

W

waterlogging
: the saturation of soils with water; often associated with insufficient oxygen for good plant growth

weather
: the day-to-day changing atmospheric conditions, which in synthesis constitute the climate of a region

weed
: a plant species growing where it is not wanted by humans

wetland
: areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres

wet sclerophyll
: a type of eucalypt forest found in high rainfall (more than 1000 mm per year) areas; sometimes called 'tall-open forests'

woodland
: an area with scattered trees where the portion of the land surface covered by the crowns is more than 30% (open woodland) but less than 60% (forest)

World Heritage
: a term applied to sites of outstanding universal natural or cultural significance which are included on the World Heritage List

X

xeromorph
: a plant having structural features usually associated with plants of arid habitats (such as hard or succulent leaves) but not necessarily drought-tolerant

YZ

HORNSBY SHIRE COUNCIL

Biodiversity Conservation Strategy

SECTION 2
Action Plan

Part A: Overarching Integrated Process

Objective 1: Conserve species, populations and communities of native plants and animals, and allow for their continued evolution and survival in Hornsby Shire in context of the region.

Background:

In order to achieve the outcome of conserving Hornsby Shire's species, populations and communities of native plants and animals, the first and most important objective of the Biodiversity Conservation Strategy involves the setting up of an **overarching integrated process** to guide biodiversity conservation outcomes. The process will be based on four themes including assembling and gaining knowledge about biodiversity and setting achievable targets, building partnerships with the community and other stakeholders to achieve the outcomes, preparing and reviewing strategic management and action plans and implementing the actions. Action plans will be prepared annually and integrated into Council's corporate management plan.

Themes:

1. **Knowledge and Targets:** Collate existing data and fill gaps

2. **Partnerships**: Form partnerships to achieve the best biodiversity outcomes.

3. **Planning:** Review and prepare planning mechnisms and prepare an Annual Biodiversity Action Plan. This will be based on emerging priorities from the recovery planning and threatened species listing process as well as local conservation priorities and issues.

4. **Implementation:** The implementation of the Annual Biodiversity Action Plan will depend on the level of funding committed by Council, and will include a number of programs as prioritised from this Action Plan. The action plan prioritises each action and sets a time frame for achievement.

Action Plan Legend

H:	High Priority	Actions to be completed within 3 years.
M:	Medium Priority	Actions to be completed within 5 years.
L:	Low Priority	Actions to be completed within 8 years.
O:	Ongoing	Action carried out on a regular basis for the term of this strategy.

Objective 1: To conserve species, populations and communities of native plants and animals, and allow for their continued evolution and survival in Hornsby Shire in context of the region.				
Priority Programs	**Action**	**Indicator**	**Priority**	**Responsibility/ Partners**
1.1 Knowledge and Targets	An ongoing process of knowledge gathering will be established including developing databases, data collection and retrieval systems, planning surveys, updating of species listings etc. The process of establishing targets will also include development of methods to implement targets and review whether they are being achieved.	Databases and systems established	O	HSC Experts Community
1.2 Partnerships	Partnership programs will be developed through establishing a Biodiversity Committee to oversee this process, and by developing a number of partnership initiatives with rural landholders, urban landholders, staff and government agencies, key community partnership incentives programs, based on capacity building, continual improvement and cost sharing.	Number of partners and community members involved	H	HSC Agencies Community
1.3 Planning	Council will prepare and amend plans to achieve biodiversity conservation targets and outcomes including strategic plans of management for bushland and open space, Hornsby LEP, DCPs, and related planning mechanisms. The Annual Biodiversity Action Plan will be prepared with an updated prioritised program of works and funding for incorporation into the Corporate Plan.	Best environmental planning practices incorporated into Council's strategic policy instruments	H	HSC
1.4 Implementation	Implementation of actions will include survey, planning, community projects, restoration and regeneration works, as well as compliance, follow up and feedback.	Percentage of annual actions completed	O	HSC Partners

Part B: Knowledge and Targets

Objective 2: Net improvement of indigenous vegetation in Hornsby Shire

Background:
The preferred target for Hornsby Shire is to achieve a net improvement for native vegetation as one of the fundamental objectives of the Biodiversity Conservation Strategy. When examining the current indicator of vegetation lost to development and comparing this to areas restored it might be argued that Council is already moving towards sustainability, although it must be recognised replanting can never completely reproduce the abundance and diversity of a natural system. It is necessary however to further develop individual targets and objectives for different types of vegetation types within the Hornsby Shire to be achieved over time frames.

What is a green offset?

Offsets may be employed only in those instances where development results in an unavoidable impact to the integrity of native vegetation. An offset action ensures that there is a net environmental improvement of native vegetation as a result of a development.

Environmental impacts on the subject site must be avoided first by using all cost effective prevention measures. Next, the impacts on the vegetation on the site must be mitigated. Only after these two steps have been fully considered, then can offsets be used to address remaining environmental impacts. Offsets are a way of compensating for the impact of development, and can be an action taken off-site that protects at least that amount or more of the same native vegetation. Offsets must never reward poor environmental performance but must result in a net environmental improvement.

A green offset is action taken that may be outside a development site (but near to it) to reduce impacts on native vegetation. The developers either take the action themselves or pay for others to do it on their behalf and might include:

- fencing off an area of bushland to exclude grazing for most of the year
- encouraging bushland to regenerate by controlling weeds
- planting or regenerating locally indigenous trees, shrubs and grasses to link up isolated patches of bush
- planting trees and indigenous vegetation on previously cleared land
- entering into a conservation agreement, property agreement or covenant to protect vegetation
- including areas of vegetation in the conservation reserve system.

Green offsets are a way of having both economic development and environmental protection. Development continues, but not at the expense of the environment. *Source: Green offsets for sustainable development, NSW Government, 2002, Camden Natural Assets Policy, 2003.*

Why vegetation and not habitats?
The protection of native vegetation is a surrogate way of conserving habitats for a range of native flora and fauna.

Key Issues:
National, Regional and Catchment Targets and Objectives
The National Objectives and Targets for Biodiversity Conservation 2001- 2005 require mechanisms to be in place at a State and regional level that:

- "by 2001 prevent the decline in the conservation status of native vegetation communities as a result of land clearance; and
- prevent clearance of ecological communities with an extent below 10 per cent of that present pre-1750;…

- have clearing controls in place that prevent clearance of ecological communities with an extent below 30 per cent of that present pre-1750; and
- have programs in place to assess vegetation condition."

The Hawkesbury Nepean Catchment Blueprint however has a Catchment Target that requires a 5% **net increase** in vegetation in the Hornsby Plateau within the catchment by 2012.

Community Sustainability Indicators
The Hornsby community have developed sustainability indicators as part of Council's Local Agenda 21 initiatives, which relate to a "vision for the Bushland Shire". The conservation of bushland and wildlife features as an important issue for the community.

A Biodiversity Committee will be established, from existing Bushland Management Committee and the LA 21 Sustainability Committees, to provide the community input into the development, review and implementation of this strategy. Membership of the committee needs to be broad to include members of the community with bushland, fauna groups, groups with and scientific interest and knowledge, Aboriginal groups, etc. to ensure that the goals and targets developed are consistent with both the community and strategic outcomes to conserve biodiversity so they can be effectively integrated into Council strategies and plans.

Objective 2: To achieve net improvement of indigenous vegetation in Hornsby Shire.				
Priority Programs	**Action**	**Indicator**	**Prio-rity**	**Responsibility/ Partners**
2.1 To achieve an improvement of indigenous vegetation in Hornsby Shire on private and public land	➢ Develop appropriate targets, actions and timeframes to achieve the conservation of various elements of biodiversity of the Hornsby Shire ➢ Examine mechanisms to measure and to achieve the targets including community programs, incentives and flexibility in planning ➢ Form a Biodiversity Committee to provide community input into the development, review and implementation of the strategy. ➢ Amend Plans of Management to explicitly state an objective of net improvement to indigenous vegetation on public land in Hornsby Shire ➢ Ensure street tree planting and revegetation programs compensate for any vegetation removed on public land	Ha lost to development No. active members + experts providing input No. locally indigenous plants being planted on public land.	H H H H M	HSC- Town Planning Services, Environmental Health & Protection, Bushland & Biodiversity, Parks and Landscapes DEC (NPWS) DIPNR

Objective 3: To collect and update biodiversity conservation information

Background:

Limited information is known about the ecology, distribution and abundance of many species in the Hornsby Shire. In addition the rate at which species are being listed as "threatened" under the NSW TSC Act, plus the listings of Key Threatening Processes and preparation of Recovery Plans is currently so rapid, that this information needs to be continually updated in Council systems to ensure Council is equipped to make sound responses on day-to-day conservation, management and planning issues that relate to threatened species as they arise. This information is also used as feedback to influence where contract bush regeneration and catchment remediation occurs and feeds into State of the Environment reporting, plans of management for bushland, bushfire planning, stormwater planning and estuarine management. An annual update of the Strategy and Biodiversity Action Plans will be undertaken to address this.

Key Issues:

Improve Knowledge of Terrestrial and Aquatic Biodiversity
There are significant gaps in the knowledge of Hornsby Shire's terrestrial biodiversity. The knowledge of systematic flora and fauna information is rated as "poor" by the NPWS for Berowra Valley Regional Park and "moderate" for the LGA (NPWS 2003). Also the final vegetation maps prepared by NPWS for the Cumberland Plain (2003) in Hornsby Shire contain significant anomalies in being based on predictive modelling and Aerial Photo Interpretation. Local naturalists have collected 820 plant species for Hornsby Shire, which are lodged in the Hornsby Shire Herbarium – this is not a complete survey of the Shire (J Lewis pers. comm. 2003). There is a need to consolidate existing data and where none exists conduct further investigations of vegetation and fauna. Investigations will be given priority in Council's programs as a number of areas are poorly understood, for example migratory species, and will be undertaken in partnership with DEC (NPWS), NSW Fisheries, community based naturalists and other experts such as universities. Council will liase with Baulkham Hills Council to ensure consistency with the vegetation project being undertaken as a pilot project under the NSW Biodiversity Conservation Strategy.

Estuaries and creeks of the Hornsby Shire are currently surveyed for macroinvertebrates, diatoms and macroalgae as indicators of ecosystem health – a snapshot of aquatic biodiversity is also a product of the survey. It is possible to collect information on broader biodiversity parameters such as riparian vegetation, fish, mammals and shorebirds.

Objective 3: To collect and update biodiversity conservation information - issues and programs				
Priority Programs	**Action**	**Indicator**	**Priority**	**Responsibility/ Partners**
3.1 Improve knowledge of terrestrial biodiversity	• Conduct investigations of vegetation and fauna according to priorities including: o refinement of endangered ecological community maps, o update of 1990 vegetation maps o survey and monitoring of endangered populations, threatened & significant species of flora & fauna & habitats including migratory species etc. o Encourage NPWS to improve level of flora and fauna survey in Hornsby Shire to a level of high	Number of biodiversity planning studies completed	O H M M L	Bushland & Biodiversity NPWS and Bushland and Biodiversity
3.2 Improve knowledge of aquatic biodiversity	• Expand survey parameters to broader aquatic/riparian biodiversity information	Aquatic data collected and analysed	M	Water Catchments
3.3 Update threatened species lists, plans and maps	• Annually update and make available its Threatened Species list, list of Key Threatening Processes, Recovery Plans, Threat Abatement Plans and Critical Habitat Maps that relate to the Hornsby Shire	Updated lists and maps available	O	Bushland & Biodiversity Water Catchments
3.4 Data management	• Maintain flora and fauna records from surveys and DA process in Council's databases and GIS.	Information available to be used in decision making	H	Bushland & Biodiversity Water Catchments

Part C: Partnerships

Objective 4: Develop key community incentives and partnerships to conserve biodiversity on private properties in Hornsby Shire

Background:

One of the problems in conserving biodiversity is that whilst people enjoy living in the "bushland shire" (Owl Surveys) and strongly favour having wildlife in their gardens (Backyard Buddies), the majority of people do not understand or relate to the term "biodiversity conservation". In addition there is no recognition of the responsibility that private landholders are expected to bear in conserving the native flora and fauna on private property. There is a critical need to better engage and support the community through a range of programs designed to conserve biodiversity on public and private land, including education, activities, partnerships, incentives programs and capacity building.

Key Programs:

Rural Lands Incentive Program
An incentive program for rural landholders to conserve biodiversity on their properties will be implemented. Key features of this program include funding for on-ground works, training courses and cash incentives for managing land for biodiversity and catchment protection.

Urban Habitat Restoration Initiative
Key urban areas have significant plant and animal communities remaining as endangered ecological communities, endangered populations or species that play a significant role as part of a wildlife corridor or stepping stone. It is recognised that vegetation and habitats in these areas are often both critically endangered or rare in the Shire and in a highly degraded condition. Council will develop a program offering biodiversity incentives to foster restoration actions within the urban community in the Hornsby Shire

Community Nursery and Earthwise Cottage
Council will expand the role of the Community Nursery to train and support residents in propagating their own plants as part of the incentives programs. In addition the Earthwise Cottage will provide information and plant packages on conserving biodiversity in urban backyards and rural properties as well as supporting the planting of provenance native species.

Other Community Programs
Council will prepare an Education Plan that promotes biodiversity in the community and responsible pet ownership. Information packages will be expanded to cover habitat creation and wildlife in the suburbs, "flora for fauna", and the guided walks program will include more information/ areas with important biodiversity values.

The social and economic values that are provided by our natural environment (environmental services) are hard to cost and to communicate to the wider community. The value of nature's environmental services of will be promoted within Council's environmental education and community programs.

Community Partnerships with Other Agencies, Schools and Landholders
Council will continue key community conservation partnerships with the Department of Environment and Conservation (NPWS) including active involvement in biodiversity conservation programs such as Land for Wildlife and Backyard Buddies.

Council will form alliances with other Councils in the Hawkesbury Nepean catchment or the Sydney Metropolitan catchment, to undertake joint community programs to ensure biodiversity conservation outcomes in the catchment context.

Where appropriate Council will become involved in supporting schemes promoting nature conservation on private land such as encouraging Voluntary Conservation Agreements, Wildlife Refuges, Tax Incentives and Vegetation Agreements, etc (see Appendix 10 for more details of programs).

Many of the Shire's school properties contain areas of remnant bushland. A program will be developed to encourage the management of these properties for biodiversity conservation and environmental education.

Partnerships with Aboriginal Communities
Council will seek the co-operative management of natural areas with Aboriginal communities to build partnerships, gain an awareness of ethnographic issues and to facilitate information exchange.

Objective 4: To develop key community incentives and partnerships to maintain biodiversity on private properties in the Hornsby Shire.				
Priority Programs	**Action**	**Indicator**	**Prio-rity**	**Responsibility/ Partners**
4.1 Rural Lands Incentives Program	• Pilot, refine and consolidate a biodiversity conservation incentives program for rural landholders	No. of properties and hectares committed	H	Bushland & Biodiversity Rural landholders
4.2 Urban Conservation Initiative	• Initiate and develop an urban habitat restoration incentives program	Amount of funding obtained and program participants	H	Bushland & Biodiversity Urban landholders
4.3 Community Nursery and Earthwise Cottage	• Expand the role of the community nursery to provide provenance specific indigenous plants to residents to conserve backyard biodiversity • Earthwise cottage develops and provides information on ways to conserve biodiversity and the value of environmental services.	No. of native plants distributed through community nursery Owl community survey results	H M	Bushland & Biodiversity Environmental Health and Protection
4.4 Educate and inform community about biodiversity	• Develop Education Plan for promotion of biodiversity in the community. • Inform residents about impacts of domestic pets on native fauna • Inform residents about importance of native flora and fauna, threatened species and significant habitats • Expand information packages/ programs about habitat creation, wildlife in the suburbs, “flora for fauna” and indigenous planting guides, etc. • Expand guided walks program to include more	No. students involved in Council environmental education programs Amount of information developed and distributed on companion animals and fauna Amount of information packages developed No. participants involved in Guided Walks	H H M H M	Environmental Health & Protection Bushland & Biodiversity Bushland & Biodiversity

	information/ areas with important biodiversity values			
4.5 Community Partnerships with Other Agencies, Schools and Landholders	• Initiate and develop incentives or community partnership programs with adjoining Councils • Seek DEC (NPWS) support in promoting community partner programs to conserve biodiversity to Hornsby Shire residents • Encourage Voluntary Conservation Agreements or other initiatives on private land • Develop a program for school properties to offer incentives, including plants, materials, advice etc. especially where they contain significant bushland, endangered ecological communities, threatened plants, etc. • Where appropriate put in place conservation covenants to which Council is a party	Number of Councils participating in joint regional programs No. of workshops/staff hours of DEC (NPWS) assisting in programs (Rural Lands Incentives Program, Land for Wildlife, Backyard Buddies, etc.) No. schools participating No. properties entering into conservation covenants No. hectares protected	O O O M L	Bushland & Biodiversity Other Councils DEC (NPWS) Landholders Public and Private Schools
4.6 Partnerships with Aboriginal Communities	• Develop co-operative management of natural areas with Aboriginal communities to build partnerships, gain an awareness of ethnographic issues and to facilitate information exchange. • Continue consultation with Aboriginal groups for the management of Bar Island Historic Site • Develop an active working relationship with the local Aboriginal groups including the Metropolitan Local Aboriginal Land Council to ensure ongoing consevation and management of Aboriginal heritage sites in natural areas	No. of meetings with HARR, Local Aboriginal Land Councils and other local Aboriginal groups	O H H	Town Planning Services Bushland & Biodiversity

Objective 5: Ensure Council activities integrate with other agencies to achieve biodiversity outcomes

Background:
Council activities can impact on our natural environment. To ensure best management practices in council works and programs are achieved, training of Council staff within their various roles is needed.

Key Issues:

Conduct staff training in biodiversity assessment and management practices
Council will build the capacity of its staff to assess biodiversity requirements by undertaking training for Planning Division and Parks staff in environmental assessment for threatened species, and for Works and Parks staff in practices such as working in or around significant bushland areas, roadside vegetation, field identification of significant vegetation and common weeds, machine based maintenance, low maintenance management (i.e. no mowing, no watering, native grasses), tree management that recognises fauna habitats, identification of some important rare plants and fauna habitats such as tree hollows and bat colonies.

Council input to State government agency conservation initiatives
Council's involvement in Berowra Valley Regional Park as the icon of "The Bushland Shire" through Council's provision of the Bushcare program, contract bush regeneration and catchment remediation devices is an important contribution to biodiversity conservation. Council involvement in Berowra Valley Regional Park reflects the importance of the park as part of the Hornsby landscape.

Integrate with other Councils and programs
Council will form alliances with other Councils in the Hawkesbury Nepean catchment or the Sydney Metropolitan catchment, to undertake joint conservation programs and continue to participate in Regional Committees with neighbouring Councils to initiate and implement biodiversity conservation (such as the Sydney North Regional Fox Control program and the Sydney North Noxious Weeds Committee).

Objective 5: To ensure Council activities integrate with other agencies to achieve biodiversity outcomes				
Priority Programs	**Action**	**Indicator**	**Priority**	**Responsibility/ Partners**
5.1 Staff training in biodiversity conservation	• Prepare and undertake a staff training program to ensure a sound working knowledge of biodiversity, how to prevent negative impacts, and how to implement positive conservation actions • Ensure any Council Divisions undertaking on ground works prepare a Review of Environmental Factors (REF) and ensure that best practice is employed to prevent negative biodiversity impacts from Council works.	No. staff trained in biodiversity conservation Net improvement of biodiversity due to Council works	H O	Bushland and Biodiversity HSC staff
5.2 Input to State government agency conservation initiatives	• Council will make input to recovery plans, threat abatement plans, critical habitat maps that affect threatened biota occurring in the Hornsby area and implement actions in recovery plans adopted by Council. • Council will provide assistance to State government agencies on programs such as the monitoring of Southern Brown Bandicoot populations and will provide information and advice to State Rail authorities about significant vegetation in rail corridors.	No. of recovery actions implemented No. of programs Council assisted	O M	Bushland & Biodiversity
5.3 Integration with other Councils	• Council will form alliances with other Councils to undertake joint biodiversity conservation programs in the catchments. • Council will continue to participate in Regional Committees such as the Sydney North Regional Fox Control Program and the Sydney North Noxious Weeds Committee	No. of regional programs HSC assists in implementing	O O	Bushland & Biodiversity

Part D: Planning

Objective 6: Ensure environmental plans and processes provide a strategic approach to achieving biodiversity conservation outcomes

Background:
Planning instruments are not currently adequate to ensure conservation of vegetation communities, habitats for threatened fauna and endangered populations. There are also issues of lack of protection for tributaries of the Lane Cove River Catchment as well as conflicts between the provision of adequate bush fire asset protection zones and the conservation of bushland on private lands. Hence there is a need to strategically review the intensity of developments allowed where there is significant bushland especially where there is bush fire prone land.

Key Issues:
Review of Planning and Development
The Hornsby Shire LEP 1994 needs to reviewed to recognise listings under the NSW Threatened Species Conservation Act 1995 and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. In addition a review of Development Control Plans or preparation of a new DCP is also required to improve outcomes for biodiversity, to protect vegetation communities that are regionally or locally significant and corridors, and to state up front Council's assessment requirements and expectations in order to reduce uncertainty. A DCP needs to ensure that in the development process important bushland and biodiversity is retained and in bushland sites a Bushland Management Plan becomes the overriding document to protect bushland and biodiversity on the site into the future.

Mechanisms for flexibility in planning will be examined for introduction such as incentives, trade-offs and credits for development that facilitates the potential for allowing an increase in development intensity and/ or height in order to conserve biodiversity where conservation outcomes are secured.

The Tree Preservation Order requires updating and examination of alternative mechanisms such as a Vegetation Protection Order to address protection of tree hollows, bushland and understorey vegetation that provides habitat for much of the Shire's biodiversity.

Development Application Process
DA Assessments contain variable standards of information, making Council assessment often difficult and lengthy. A set of standards has been in development by DEC (NPWS) for many years. Should this not be forthcoming in a reasonable timeframe there is a need for Council to develop its own guidelines.

Other Strategic Plans
Council will prepare, review and provide input to other planning documents that affect biodiversity conservation, such as the Water Cycle Management Strategy, bushfire risk management plans, annual hazard reduction programs, catchment blueprints, plans for major transport corridor

upgrades, noxious weed plans, section 94 contributions plans, local agenda 21 plans, estuary, stormwater and catchment management plans, infrastructure and capital improvements plans and programs, strategic plans and planning instruments. Such reviews will ensure that biodiversity conservation is given consideration in key strategic documents.

Objective 6: To ensure environmental plans and processes provide a strategic approach to achieving biodiversity conservation outcomes.				
Priority Programs	**Action**	**Indicator**	**Priority**	**Responsibility/ Partners**
6.1 Amend Hornsby Local Environmental Plan to conserve biodiversity	• Review LEP to: o protect and enhance vegetation communities of national and state conservation significance o protect known habitats of threatened fauna and endangered populations o examine mechanisms to assist private properties in conserving vegetation including incentives, flexibility in planning such as trade-off and offsets or the establishment of a fund to facilitate acquisition of environmentally sensitive land	Ha. lost to development No. of ha protected through alternative mechanisms	H	Town Planning Services DEC (NPWS) DIPNR
6.2 Amend Development Control Plans to conserve biodiversity/ prepare new DCP	• Amend DCP's or prepare new DCP to ensure developments achieve the following outcomes: o protect vegetation communities of national, state, regional and local conservation significance o protect tree hollows and native vegetation o protect known habitats of threatened fauna and endangered populations o require a Property Management Plan to be prepared where significant vegetation is to be affected, which integrates the development with bushland and biodiversity conservation, bushfire management, stormwater management etc. o include prescribed setbacks and buffer zones for development adjoining bushland o protect aquatic habitats from potential impact of acid sulphate soils	Percentage of DAs that meet new DCP requirements	H	Town Planning Services DIPNR
6.3 Introduce standards for biological surveys in Development Applications	• Establish a set of standards which are adaptable to the circumstances of each application, but which ensure that sufficient information is presented to allow an accurate appraisal of the likely impact of development on endangered communities and biodiversity generally. • Introduce a requirement for surveys for aquatic species and assessments of impacts as part of DA process	Standards set for ecological surveys	M L	Bushland & Biodiversity DEC (NPWS) Water Catchments

	• Audit compliance with DA conditions to ensure biodiversity outcomes are met	Audit the compliance with conditions of development consent	H	Environmental Health & Protection
6.4 Protect biodiversity elements through amendment to the Tree Preservation Order (TPO) or new Vegetation Protection Order (VPO)	• Review TPO or develop VPO that effectively protects remnant trees, tree hollows and associated understorey vegetation, (in particular communities of national, state, regional and local conservation significance) • On occasions where removal of plants is approved, require compensatory replanting with locally indigenous plant species and use opportunities to encourage residents to maintain or re-establish any patches of remnant vegetation on their land • If tree hollows are removed, require their replacement on a retained tree nearby or a similar sized artificial hollow such as nest boxes established on site	Importance ranking of tree preservation in community Owl survey No. sites undertaking compensatory planting No of relocated and artificial hollows	H O O	Parks and Landscape Bushland and Biodiversity
6.5 Prepare Water Cycle Management Strategy	• Prepare a Water Cycle Management Strategy that encompasses aquatic biodiversity conservation issues including mapping of habitat distribution, assessment of species density and diversity, condition assessment and threat mitigation, and planning for protection of habitats and species	Diversity and abundance of macroinvertebrates	H	Water Catchments
6.6 Bush Fire Management	• Provide submission to review of Bush Fire Risk Management Plan and Bush Fire Environmental Assessment Code on: o appropriate fire regime for threatened plant species with appropriate intensity and interval between fires o protection of habitats for threatened fauna species in hazard reductions for example by retaining areas of cover for refuge, by prevention of burning along ephemeral/ permanent creeklines, and the base of known Koala feed trees and bat roost trees o protection from too frequent fire owl nest sites and arboreal mammal density (owl prey species) • Provide Rural Fire Service with regular updates on threatened species, endangered ecological communities and other significant flora and fauna information for the Hornsby Shire	Submissions made to RFS on biodiversity issues Amount of flora and fauna information provided to RFS	O O	Bushland and Biodiversity

Part E: Implementation

Objective 7: Maintain and improve the management of biodiversity on public land in Hornsby with the community

Background:

The historical dedication and acquisition of bushland reserves occurred for a variety of environmental, planning and social reasons, without a comprehensive strategic approach. In addition Local Government did not broadly encompass bushland management as is expected by today's community.

Key Issues:

- Land Assessment- Rationalisation, Acquisition and Dedication: the quality, size, shape and location of reserves will be assessed and if found to be of low biodiversity conservation value and not required by the community, Council will sell the land to fund the purchase and management of new conservation reserves of high biodiversity value. An increased financial commitment will be made to the acquisition and management of important areas for biodiversity.
- Plans of Management for community land categorised as natural areas should be reviewed and include water catchment data into management objectives and actions where relevant.
- Catchment Remediation Rate projects: new projects will include emphasis on conserving aquatic habitats and riparian restoration.

- Bush Regeneration: existing contract bush regeneration will be expanded and more community participation fostered through the Bushcare Program and encouraging indigenous plantings by residents in adjoining gardens to strengthen vegetation links.
- Fauna Conservation: management practices on public lands will be improved through better documentation of records and improvements to fauna habitats as better knowledge is obtained on species' requirements.
- Park Management: Council will ensure biodiversity conservation actions are included in the management of open space.
- Biodiversity Icon Parks: Council will recognise the parks which feature significance to the community for their bushland values. It is proposed these parks be given a status as biodiversity icons and showcased as special natural environments that the community can visit. Such parks could include areas of Berowra Valley Regional Park, Reddy Park, Bar Island and Carrs Bush in Fagan Park where the significance to the community and conservation values makes them an icon for biodiversity protection.

Objective 7: To maintain and improve the management of biodiversity on public land in Hornsby with the community.				
Priority Programs	**Action**	**Indicator**	**Priority**	**Responsibility/ Partners**
7.1 Land Assessment	• Dedicate reserves to protect threatened terrestrial and aquatic species • Rationalise assets of low biodiversity and community value • Investigate declaration of an aquatic reserve for Adams Emerald Dragonfly *Archaeophya adamsi* in Tunks Creek and an aquatic reserve/ marine park dedication for Big Bay in Marramarra Creek	No. hectares dedicated for conservation Funds raised for acquisition	O M M	Bushland & Biodiversity Property Development Water Catchments
7.2 Plans of Management	• Review, update, implement and educate staff about the Plans of Management (POMs) for Open Space and Significant Areas Bushland Plans of Management and Action Plans to ensure conservation of biodiversity	No. POM's adopted by Council	H	Parks & landscape Bushland & Biodiversity
7.3 Water quality and riparian remediation works (CRR)	• Catchment Remediation Rate (CRR) projects are implemented to o conserve riparian and aquatic habitats and prevent weed invasion o restore creekline habitats that have become eroded, scoured or otherwise degraded o undertake weed and stormwater control in tributaries of significant bushland habitat and known threatened fauna habitats o maintain water quality control ponds to protect threatened invertebrates	No. CRR projects with improved habitats No. contract bush regeneration sites targeting riparian areas No. threatened invertebrates recorded in catchments	O	Water Catchments Bushland & Biodiversity
7.4 Bushland regeneration	• Undertake and expand bush regeneration programs with priorities given to known locations of significant bushland, endangered ecological communities, threatened plants and wildlife corridors • Improve smaller bushland remnants and remnants with poor boundary configurations and form linkages especially of Endangered Ecological	No. ha under active restoration Ha revegetated	O	Bushland & Biodiversity

	Communities by strategic re-planting of bushland with the use of local provenance plants • Encourage more volunteers to participate in the bushcare programs • Encourage neighbours to plant indigenous species in their gardens	No. active volunteers No. plants to residents from community nursery	O O O	
7.5 Fauna Conservation	• Review bush regeneration , weeding and CRR contracts to include fauna habitat considerations such as no overclearing of weed habitat, specific planting requirements and intoduction of hollow logs and rocks. • Document and inform staff of fauna records including bat roost site/s (stormwater pipes, bridges, trees), bird nest sites, bird foraging areas and other habitats of species including wetlands • Conserve and restore cockatoo, parrot and honeyeater habitat (i.e. Blue Gum High Forest and Swamp Mahogany Forest) in streetscapes, parks and near development areas • Monitor records and habitat of significant fauna	No. best management practice provisions included in bush regeneration and works contracts	O O O O	Bushland & Biodiversity Parks & Landscapes
7.6 Park and Bushland Management	• Cease mowing in parks where there is an opportunity to rehabilitate Endangered Ecological Communities or conserve fauna habitat • Curtail excessive recreational use that is damaging bushland by rehabilitating degraded areas • In open space parks conserve tree hollows and undertake habitat planting programs including establishment of growing native food patches for wildlife care • Prepare and implement fire plans for Hornsby parks and reserves that balance fire management with conservation of biodiversity and locate asset protection zones on private land where possible	No. hectares where mowing has ceased Metres of tracks restored Area planted for fauna programs No. parks and reserves included in strategic HR plan	O O H H	Parks & Landscape Bushland & Biodiversity
7.7 Biodiversity Icon Parks	• List Hornsby's Icon Parks and seek separate funding for improvement of their biodiversity values.	Amount of funding received for Icon areas	M	Bushland & Biodiversity

Objective 8: Effectively mitigate threats to conserving biodiversity

Background:
A range of threats affect biodiversity in Hornsby Shire including vegetation clearing, exotic weeds, predation and grazing by feral animals, bush fire management activities, pollution, erosion, altered water regimes, fragmentation of bushland, rubbish dumping, and overharvesting of marine species etc.

New potential threats to biodiversity are rapidly occurring as are listings of Key Threatening Processes under state and federal legislation (Appendices 7 & 8).

Key Issues::
The Annual Biodiversity Action Plan will be based on a risk and consequence model to incorporate the greatest threats to Hornsby's biodiversity, which can rapidly come into play. Threats and responses will be viewed from a catchment perspective, co-operating with other Councils.

Council will monitor threats and implement recovery actions. For example, new threats may become a problem specifically in Hornsby Shire such as Frogpond fungus (a waterborne amphibian disease chytridiomycosis), and Beak and Feather Disease in the Gang Gang Cockatoo population which could affect the way we manage artificial nest boxes. In addition fungal diseases that can affect vegetation such as Armillaria and Phytophthora may occur and appropriate actions rapidly introduced through the Annual Action Plan.

Objective 8: To effectively mitigate threats to conserving biodiversity in Hornsby.				
Priority Programs	**Action**	**Indicator**	**Priority**	**Responsibility/ Partners**
8.1 Threat abatement	• Monitor threats and take actions as key threatening processes are listed and as other priorities arise	Measures taken to mitigate threats	O	Bushland & Biodiversity
8.2 Recovery actions	• Implement HSC recovery actions where NPWS recovery plans are adopted by Council	No. of actions completed	O	Bushland & Biodiversity
8.3 Environmental and Noxious Weed Programs	• Prepare a Weeds Strategy to: o Control weeds on private lands, with particular attention to those within the catchments of major bushland areas o Monitor potential weed infestations of significant areas such as seagrass beds by *Caulerpa taxifolia* or other pest species	No. of noxious weed notices issued No. of private properties participating in weed control through other Council programs No outbreaks *Caulerpa taxifolia* in estuaries	H O	Bushland & Biodiversity Water Catchments NSW Fisheries
8.4 Feral and pest animal control programs	• Implement comprehensive fox control program • Investigate feral cat control program • Continue cooperative approach to rabbit control in the Rural district • Monitor and address priority pest animal issues that arise	No. of fox baits taken No. of feral cats removed from bushland No. of properties particpating in rabbit control	O H O O	Bushland & Biodiversity DEC (NPWS) RLPB
8.5 Hazard reduction programs	• All hazard reduction in significant remnants on land managed by Council require a Review of Environmental Factors to determine appropriate reduction technique	Loss of significant biota through HR program	O	Bushland & Biodiversity
8.6 Fire trail and track management tracks	• Siting of new tracks and maintenance works should: o avoid known locations of threatened species o mitigate impacts with best practice measures • Locate and liaise with utility and other authorities regarding protection of threatened species on fire trails, walking tracks, service tracks & road edges.	No. of inappropriate clearing or dumping events on management tracks and fire trails	O O	Bushland & Biodiversity/ Works DEC (NPWS) Rural Fire Service Sydney Water Transgrid

				Energy Australia
8.7 Illegal vegetation clearing cases	• Improve Council's performance in prosecuting cases of illegal clearing of bushland and ensure preparation and implementation of site specific vegetation restoration plans on affected land at the landowners expense	No. of cases successfully prosecuted	H	Environmental Health & Protection
8.8 Pathogens & disease control	• Investigate and evaluate risk management approach to pathogens and disease	No. of serious outbreaks recorded in Shire	O	Bushland & Biodiversity Parks & Landscape
8.9 Impacts of climate change and sea level rise	• Monitor loss of saltmarsh and investigate/ plan for remedial measures • Monitor loss of habitats and species and investigate/ plan for remediation measures	Amount of saltmarsh receding annually	H O	Water Catchments
8.10 Pollution mitigation	• Continue to implement the CRR 5 Year Plan to decrease impacts of nutrients, effluent, impacts of turbidity and suspended sediments, chemicals, oils etc. • Monitor fresh water inundation of estuaries and marine environments, for example *Phragmites australis* incursion into saltmarsh, and introduce remedial actions • Monitor activities that potentially release acid sulphates and undertake any remedial actions.		O M O	Water Catchments Environmental Health & Protection
8.11 Overharvesting of resources	• Prepare and implement Management Plan for commercial and recreational fishing in Berowra Creek. • Monitor ground water extraction and impacts on perched swamps, rivers and streams.		M L	Water Catchments
8.12 Mitigate impacts on aquatic habitats	• Refer developments to NSW Fisheries under the Habitat Protection Plans that propose de-snagging, dredging, impedence to fish passage and other impacts on fish habitat such as damaging marine vegetation. • Assess Development Applications, ensure Urban Streams element of DCPs is adhered to & best practice is achieved in urban and rural areas to protect aquatic habitats from changed creek morphology from piping, erosion, high, scouring flows and sedimentation.		O O	Planning Water Catchments

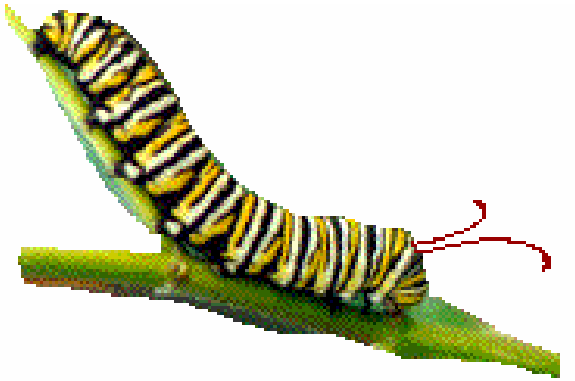
Objective 9: Conserve and re-create connectivity across fragmented landscapes

Background:

Historically, corridors have occurred in road reserves, creeklines and rail corridors, being areas of undeveloped land with remnant vegetation and native fauna habitats. These areas have provided a windfall for biodiversity conservation, providing evidence of original plant and animal communities and creating links for movement. The original Fauna Corridors study of 1994 identified corridors and vegetation links in Hornsby Shire which has been partly implemented through grant funding. This study now needs to be reviewed and requires update to include recent mapping and other flora and fauna information.

Key Issues:

- Establish projects aimed to conserve road and rail corridor vegetation
- Expand and implement the Rural Roads Plan of Management to conserve native vegetation in the rural areas
- Enhance connectivity between major habitat areas utilising public land
- Encourage co-operative research projects to improve understanding and management of corridors



Objective 9: To conserve and recreate connectivity across fragmented landscapes.				
Priority Programs	**Action**	**Indicator**	**Priority**	**Responsibility/ Partners**
9.1 Road reserves and rail corridors	• Undertake a project to conserve and link significant remnants on road reserves (in particular Blue Gum High Forest and Sydney Turpentine-Ironbark Forest remnants) • Manage unmade road reserves to conserve vegetation and fauna habitat • Establish a project to conserve vegetation along rail corridors in partnership with rail authorities, NPWS and others (especially Blue Gum High Forest and Sydney Turpentine-Ironbark Forest) • Liase with Energy Australia to secure conservation of significant roadside vegetation	Amount of funds spent on road and rail corridors	H O M M	Works Bushland & Biodiversity Parks & Landscape Rail Authorities Energy Australia
9.2 Rural Roadside Vegetation Plan and other Plans of Management that forms part of a corridor	• Review, update, expand and educate staff about the Rural Roadside Vegetation Plan of Management to all parts of the Rural Area to ensure consistent approach of all parts of Council to manage vegetation on rural roads • Review, update, implement and educate staff about the Plans of Management for Open Space and Significant Areas Bushland Plans of Management and Action Plans to ensure conservation of biodiversity	No. of staff trained to conserve rural roadside vegetation No. of staff aware of policies in POM's and corridor management	H M	Works Parks & Landscape Bushland & Biodiversity
9.3 Wildlife Corridors	• Review, update and expand the Wildlife Corridors 1994 report examining vegetation remnants, linear vegetation around roads, railways and creeks and potential corridors.	Accurate and improved maps produced	H	Bushland & Biodiversity
9.4 Research projects	• Encourage/ facilitate research projects to combine ecology, biology and genetics with management needs of urban and rural corridors	No of research projects undertaken	L	HSC NPWS Universities

Objective 10: Develop and implement effective systems to fund and manage biodiversity conservation actions

Background

Biodiversity conservation has not traditionally been recognised as requiring funding at the local government level. The community now recognises the values of the environment and the services provided for life itself. This Strategy will provide a tool for Council to consider biodiversity management at the corporate level and to obtain secured funding sources for achieving coordinated biodiversity conservation outcomes.

Key Issues

Actions within this plan require funding on an annual basis through Council's budget process. The Annual Biodiversity Action Plan will be formulated by the Biodiversity Committee and following due process included in the Council Service Plan (refer to Overarching Integrated Process).

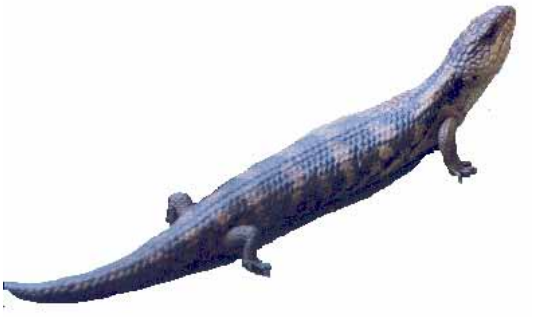
This objective has also identified the following funding streams to assist Council in implementing the Plan:

- Land assessment and rationalisation (cross reference to land acquisition and management)
- Section 94 funds
- Catchment Remediation Rate
- Grants

Objective 10: To develop and implement effective systems to fund, manage and update biodiversity conservation actions and information.				
Priority Programs	**Action**	**Indicator**	**Priority**	**Responsibility/ Partners**
10.1 Annual review of Strategy and Biodiversity Action Plan	• Annually review the Biodiversity Conservation Strategy and prepare a Biodiversity Action Plan reflecting altered priority actions as part of Council Management Plan and Services Plan.	No of staff and community involved in review	O	HSC staff Community stakeholders Biodiversity Committee
10.2 Secure funding sources	• Provide an increased commitment to the acquisition and management of bushland • Facilitate acquisition and management of important sites through sale of Council assets • Investigate corporate sponsorship and other funding opportunities • Review Council's Section 94 Plan to ensure funds are collected for acquisition and upgrade of significant bushland. • Recognise the importance of terrestrial ecosystem health and catchment protection in providing good water quality outcomes by contributing funds towards terrestrial restoration programs in addition to the traditional engineering approach. • Apply for grants and lobby government to provide targeted biodiversity conservation funds to address programmed actions.	Amount of funding to implement action plan recieived	O O M O H O	HSC State and Federal government Other

HORNSBY SHIRE COUNCIL Biodiversity Conservation Strategy

SECTION 3 Appendices



Appendix 1: Strategic Context for Biodiversity Conservation

Overarching International and National Framework

Agenda 21

On 22 December 1989 the United Nations called for a global meeting to devise a strategy to halt and reverse effects of environmental degradation in the context of increased national and international efforts to promote sustainable and environmentally sound development in all countries.

Agenda 21 was adopted by the United Nations Conference on the Environment and Development in Rio de Janeiro and is the international community's response to that request. It is a comprehensive program of actions to be implemented by Governments, development agencies, UN organisations and independent sector groups in every area where human (economic) activity affects the environment.

Johannesburg Earth Summit

The second Earth Summit was held in Johannesburg in August 2002. The Johannesburg Plan of Implementation provides a 10-year implementation and action plan with agreed global priorities for action addressing production and consumption for developed and developing countries. Commitments were made on expanding access to water and sanitation, on energy, improving agricultural yields, managing toxic chemicals, protecting biodiversity and improving ecosystem management— not only by governments, but also by NGOs, intergovernmental organisations and businesses, who launched over 300 voluntary initiatives.

The need for practical and sustained steps to address many of the world's most pressing problems led to the establishment of new targets, such as: to halve the proportion of people without access to basic sanitation by 2015; to use and produce chemicals by 2020 in ways that do not lead to significant adverse effects on human health and the environment; to maintain or restore depleted fish stocks to levels that can produce the maximum sustainable yield on an urgent basis and where possible by 2015; and to achieve by 2010 a significant reduction in the current rate of loss of biological diversity.

More than 300 voluntary partnerships were signed, each of which will bring additional resources to support efforts to implement

sustainable development. These partnerships, tied to the government commitments, provide a built-in mechanism to ensure implementation. Stakeholders, especially governments, civil society and the private sector, were forced to confront the needs and the arguments of others in a truly interactive dialogue. Partnerships are not intended to replace the need for government funding and commitments; but are intended to deepen the quality of implementation.

Australia is now to produce an Action Plan to ensure follow-through on these commitments to its role in achieving sustainable development, protecting our planet and to take on ground actions. Fulfilling these commitments will require new and additional resources.

UN Convention on Biological Diversity

The Convention on Biological Diversity was opened for signature at the same UN Conference June 1992 and came into force at the end of 1993 being ratified by the overwhelming majority of countries.

Other international agreements relating to biodiversity conservation include the Japan Australia Migratory Bird Agreement, China Australia Migratory Bird Agreement, World Heritage Convention, Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), Bonn Convention, Ramsar Convention.

Intergovernmental Agreement on the Environment (IGAE) and Council of Australian Governments - Heads of Agreement on Commonwealth/ State Roles and Responsibilities for the Environment

In 1992 the Commonwealth, State and Territory Governments and the Australian Local Government Association made an agreement (IGAE) establishing a cooperative national approach to the environment which also recognises the role of Local Government in environmental management. Its environmental policy encompasses the precautionary principle, intergenerational equity, conservation of biological diversity and ecological integrity and improved valuation, pricing and incentive mechanisms. In 1997 the IGAE was replaced by the Council of Australian Governments - Heads of Agreement on Commonwealth/ State Roles and Responsibilities for the Environment.

National Strategy for the Conservation of Australia's Biological Diversity 1996

The Strategy provides the framework for protecting Australia's Biodiversity and has been endorsed by Commonwealth, State and Territory governments. Its aim is to bridge the gap between current activities and those measures necessary to ensure the effective identification, conservation and ecologically sustainable use of Australia's biological diversity. It also seeks to fulfil Australia's commitment to the International Convention on Biodiversity. Its objectives are to:

1. *Identify important biological diversity components and threatening processes.*
2. *Manage biological diversity on a regional basis, using natural boundaries to facilitate the integration of conservation and production-oriented management.*
3. *Improve the standards of management and protection of Australia's biological diversity by encouraging the implementation of integrated management techniques.*
4. *Establish and manage a comprehensive, adequate and representative system of protected areas covering Australia's biological diversity.*
5. *Strengthen off-reserve conservation of biological diversity.*
6. *Ensure the maintenance of, and where necessary strengthen, existing arrangements to conserve Australia's native wildlife.*
7. *Enable Australia's species and ecological communities threatened with extinction to survive and thrive in their natural habitats and to retain their genetic diversity and potential for evolutionary development, and prevent additional species and ecological communities from becoming threatened.*
8. *Recognise and ensure the continuity of the contribution of the ethnobiological knowledge of Australia's indigenous peoples to the conservation of Australia's biological diversity.*
9. *To complement in-situ measures, establish and maintain facilities for ex-situ research into and conservation of plants, animals and microorganisms, particularly those identified by action taken in accordance with Objective 1.*

Commonwealth Environment Protection and Biodiversity Conservation Act, 1999

The EPBC Act gives the Commonwealth an approval role for certain kinds of development, which are considered to be of national environmental importance. This Act came into effect in mid-2000 and outlines objectives for protecting matters of national environmental significance. This Act does not form part of Council's development assessment process.

Under its provisions, actions that are likely to have a significant impact on a matter of national environmental significance are subject to a rigorous assessment and approval process by the

Commonwealth. The Act currently identifies six matters of national environmental significance:

- World Heritage properties
- Ramsar wetlands of international significance
- listed threatened species and ecological communities
- listed migratory species
- Commonwealth marine areas
- nuclear actions (including uranium mining).

If Council's own developments are likely to have a significant effect matters of national environmental significance, then it must seek approval from the Commonwealth Government. It should be noted that a number of the threatened species that occur in the Hornsby Shire are listed in the EPBC Act.

National Objectives and Targets for Biodiversity Conservation 2001-2005

The objectives and targets introduced the following key actions to mitigate threats to Australia's biodiversity, along with objectives, targets and performance measures:

1. Protect and restore native vegetation and terrestrial ecosystems
2. Protect and restore freshwater ecosystems
3. Protect and restore marine and estuarine ecosystems
4. Control invasive species
5. Mitigate dryland salinity
6. Promote ecologically sustainable grazing
7. Minimise impacts of climate change on biodiversity
8. Maintain and record ethnobiological knowledge
9. Improve scientific knowledge and access to information
10. Introduce institutional reform

NSW Framework for Conserving Biodiversity

NSW Biodiversity Strategy

The NSW Biodiversity Strategy was launched in 1999 proposing a framework for co-ordinating and integrating government and community efforts to conserve biodiversity. It was prepared in response to the National Strategy, which called on State and Territory governments to develop complementary biodiversity strategies. It builds on principles of ecologically sustainable development, with the Strategic Goal being "to protect the native biological diversity of NSW and maintain ecological processes and systems".

The Strategy is in five main areas, which each have objectives, priority actions and performance targets and a framework for implementation.

1. community consultation, involvement and ownership
2. conservation and protection of biodiversity
3. threatening processes and their management
4. biodiversity conservation and natural resources management
5. improving our knowledge.

NSW Local Government Act, 1993

The Local Government Act, requires Council to take biodiversity into account in its actions. The charter of a Council empowers Council 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 sustainable development' [section 8(1)].*

Council's overall **Management Plan** must include relevant details on any proposed principal activity 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'* [section 403(2)]. Council must consult and involve the community regarding environmental protection activities [clause 29(1) Local Government (General) Regulation 1999]. The Council must also reflect application of the principles of ESD in that part of the management plan dealing with environmental protection activities [clause 29(1)(a) LGG Reg].

Service provision by Council can cover a wide range of activities [section 24 LG Act] that can be utilised to conserve biodiversity, i.e. providing education and information services, carrying out tree planting or other works on private land [section 67 LG Act], or implementing grant schemes to encourage members of the community to undertake biodiversity conservation activities even on private land [subject to section 356 LG Act].

Management and use of community land must be in accordance with plans of management [Section 36 LG Act]. Plans of management are to categorise the land as being, for example, a natural area, and further subcategorise natural areas as bushland, wetland, escarpment, watercourse, and foreshore; and define objectives, performance targets and the means by which these will be met and measured. Significant area plans are to be prepared where there is a Council resolution under section 36C for land containing

significant natural features, or if the land is directly affected by a Recovery Plan or Threat Abatement Plan [under the *Threatened Species Conservation Act 1995* or *Fisheries Management Act 1994*]. The use of such land must refer to any proposed lease, licence or other estate proposed to be granted by a Council which must be consistent with core objectives set out by the Act for each category and subcategory [section 46 LG Act].

As part of the **Annual Report** Council must prepare a report as to the **State of the Environment** of the area. The report must address a number of sectors including biodiversity and must consult with and involve the community in monitoring changes to the environment. Council must consider the main issues identified in its SOE report when preparing that part of a draft Council Management Plan dealing with environmental protection activities.

NSW Environmental Planning and Assessment Act, 1979

The EP&A Act has specific objectives to protect the environment, including conservation of native animals and plants, threatened species, populations and ecological communities and their habitats, and to encourage ecologically sustainable development.

Under this Act Council has three main functions - preparing environmental plans for the area, as a consent authority for development applications for the area, and as a determining authority for activities not requiring development consent.

In the preparation of **Local Environmental Plans** Council can protect or preserve trees or vegetation [section 26(1)(e) EP&A Act], protect or conserve native plants and animals [section 26 (e1) EP&A Act], including any listed as threatened species, endangered populations and endangered ecological communities under the *Threatened Species Conservation Act 1995* or the *Fisheries Management Act 1994*. Council must consult with the Director-General of the National Parks and Wildlife Service before preparing an Environmental Study or a draft Local Environmental Plan, if in the opinion of the Council, critical habitat or threatened species, populations or ecological communities, or their habitats, will or may be affected by the environmental study or draft plan.

As a consent authority for **Development Applications**, Council considers the likely impacts on the natural environment under Section 79C(1). Applications must also consider whether there is likely to be a significant effect on threatened species, populations

and ecological communities listed under the *Threatened Species Conservation Act 1995* or the *Fisheries Management Act 1994*, or their habitats. When considering applications Council must consider Environmental Planning Instruments, which include State Environmental Planning Policies (such as. *SEPP 14 - Coastal Wetlands, SEPP 19 – Bushland in Urban Areas, SEPP 26 – Littoral Rainforest, SEPP 44 – Koala Habitat Protection),* Regional Environmental Plans (such as *Hawkesbury REP 20*) and their equivalent Regional Vegetation Management Plans prepared under the *Native Vegetation Conservation Act, 1997.*

Council is a **determining authority under Part 5** of the EP&A Act for its own activities that do not require development consent, and must consider impacts of those activities on ecosystems and the endangering of species.

NSW Threatened Species Conservation Act, 1995

The Threatened Species Conservation Act has significant obligations on Council due to the cognate provisions it makes under the EP&A Act as described above where Council **assesses impacts of development** proposals on listed threatened species, populations and ecological communities and, under certain circumstances, consults with the NPWS or NSW Fisheries.

The TSC Act establishes the **NSW Scientific Committee who list threatened species, populations and endangered ecological communities** under the Act. Council can make nominations or submissions for listings by the Scientific Committee.

The Act provides for listing of **key threatening processes** and for declaration of '**critical habitat**'.

Council may have input into the preparation of **Recovery Plans** by the NPWS, made for each listed threatened biota. Council must consider any relevant Recovery Plan when assessing a development application. Council must also undertake any binding actions described in the Recovery Plan on Council owned land, and report in its SOE any such actions undertaken for which Council is responsible in the Recovery Plan. There are also specific requirements under the LG Act for plans of management for community land that is affected by a Recovery Plan.

Threat Abatement Plans are prepared by the NPWS in relation to key threatening processes and Council may have input to their

preparation. The TSC Act has a requirement for an entity (such as Council) to be **licensed** if it is to undertake actions likely to harm animals or pick plants that are threatened species, populations and ecological communities, or to damage their habitat or critical habitat, unless it has a consent or approval under Part 4 or 5 of the EP&A Act.

The TSC Act outlines requirements for the preparation and contents of **Species Impact Statements**. These are prepared where a proposed development or activity is likely to have a significant effect on threatened species, populations and ecological communities. An SIS may be required when assessing developments or activities under Part 4 or 5 of the EP&A Act and when assessing a licence application.

The Threatened Species Legislation Amendment Act 2004 established a requirement to prepare a 3 year Priorities Action Statement (PAS) that will set out the recovery and threat abatement strategies to be adopted for promoting the recovery of each threatened species, population and ecological community to a position of viability in nature. It will also establish relative priorities for implementation, establish performance indicators and report on the achievements and their effectiveness. These will complement recovery plans.

NSW Fisheries Management Act 1994

The Fisheries Management Act contains provisions that mirror those in the TSC Act, in relation to aquatic animals and marine vegetation. It provides for the listing of threatened species, populations and ecological communities and key threatening processes, declaration of critical habitat and the preparation of recovery plans and threat abatement plans. It also has cognate provisions in the EP&A Act, i.e. when Council assesses a proposal for a development or an activity under Part 4 or 5 of the Act, it has the same responsibilities as those in relation to the TSC Act.
Habitat Protection Plans No. 1 and 2 (General and Seagrasses) have been prepared under the ***Fisheries Management Act 1994.*** The Plans balance the needs of fish and fishes and those of the broader community with the aim of protecting fish habitat, and require public authorities to take the plans into account in carrying out their duties and functions, with a number of activities requiring the approval of the Minister for Fisheries.

Catchment Management Act 1989

This focussed attention on the holistic management of catchments to achieve sustainable use of catchments and conservation of biodiversity. Following the introduction of the Act, a number of policies were developed and refined including the ***NSW Rivers and Estuaries Policy***, the ***Estuary Management Policy*** and the ***Wetlands Management Policy***.

Recent Reforms

At the toime of writing three bills were introduced, ***Catchment Management Authorities Bill 2003*** which replaces the ***Catchment Management Act*** and establishes catchment authorities to prepare and implement catchment action plans. Associated legislation is the ***Natural Resources Commission Bill 2003*** which requires the establishment of state-wide environmental standards and targets and the ***Native Vegetation Act 2003*** which replaces the ***Native Vegtation Conservation Act***, and applies to Hornsby Shire in its transition phase only

NSW Rivers and Foreshores Improvements Act, 1948

Under the Rivers and Foreshores Improvements Act development applications are referred by Council to Department of Infrastructure, Planning and Natural Resources as **integrated development** for any work within 40m of the top of the bank of any stream of water. Matters considered by DIPNR include soil, water and vegetation conservation. Through this process and through consideration of the **Sustainable Waters Development Control Plan,** Council has provided protection land adjoining the banks of streams.

Regional and Local Framework

Habitat Protection Plan No. 3 for the Hawkesbury Nepean 1998– this plan applies to the river system and its catchment and aims to prevent further deterioration of fish habitats and to facilitate their rehabilitation.

The ***Hawkesbury Lower Nepean Catchment Blueprint*** was adopted by NSW Cabinet in 2002 and identifies four key issue areas of river health, biodiversity, land use and partnerships. Under biodiversity four main issues include:

Knowledge/ decision-making support

- Conservation of native aquatic and terrestrial biodiversity
- Aquatic and terrestrial weeds and pests
- Community action to conserve biodiversity

The ***Sydney Harbour Catchment Blueprint 2002*** key catchment issues include water quality and quantity, aquatic and terrestrial biodiversity, land use and capability, community education and participation, information exchange networks and access, cultural heritage, planning and management.

Bushcare group restoring Sydney Turpentine-Ironbark Forest

Appendix 2: NSW threatened species, populations and ecological communities in Hornsby Shire

Species without annotation occur in the Hornsby Shire
* = potentially present in the Hornsby Shire
**= vagrant/non-resident

NSW Threatened Species Conservation Act, 1995
Schedule 1: Endangered species, populations and ecological communities

Part 1: Endangered Species

Animals

Amphibians

*Litoria aurea (*Green & Golden Bell Frog)*below

Reptiles

*Hoplocephalus bungaroides (*Broad-headed Snake)*

Birds

*Burhinus grallarius (*Bush Stone Curlew)*
Lathamus discolor (Swift Parrot)**
Macronectus giganteus (Southern Giant-Petrel)
Xanthomyza phrygia (Regent Honeyeater)**

Mammals

Isoodon obesulus obesulus (Southern Brown Bandicoot)

Invertebrates

Meridolum corneovirens (Cumberland Plain Land Snail)
Petalura gigantea (Giant Dragonfly)*

Plants

Acacia bynoeana
Acacia gordonii
Asterolasia elegans
Caladenia tesselata

Eucalyptus sp. *Cattai*
Galium australe
Grammitis stenophylla
Grevillea parviflora subsp. *supplicans*
Persoonia hirsuta (Hairy Geebung)
Persoonia mollis subsp. *maxima*
Zieria involucrata

Part 2: Endangered Populations

Animals

Birds

*Callocephalon fimbriatum (*Gang-gang Cockatoo)

Plants

Darwinia fascicularis subsp. *oligantha*
Wahlenbergia multicaulis

Part 3: Endangered Ecological Communities

Blue Gum High Forest
Duffys Forest
Shale/Sandstone Transition Forest
Sydney Turpentine- Ironbark Forest
Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South-East Corner Bioregions shown below

Swamp sclerophyll forest on coastal floodplains of the NSW North Coast, Sydney Basin and South-East Corner Bioregions
River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South-East Corner Bioregions
Swamp oak floodplain forest of the NSW North Coast, Sydney Basin and South-East Corner Bioregions

Schedule 2: Vulnerable Species

Animals

Amphibians

Heleioporus australiacus (Giant Burrowing Frog)
Pseudophryne australis (Red-crowned Toadlet)

Reptiles

Chelonia mydas (Green Turtle)
Dermochelys coriacea (Leathery or Luth Turtle)
Varanus rosenbergi (Heath Monitor)

Birds

*Callocephalon fimbriatum (*Gang-gang Cockatoo)
Calyptorhynchus lathami (Glossy Black-Cockatoo)
Climacteris picumnus victoriae (Brown Treecreeper)*
Haematopus fuliginosus (Sooty Oystercatcher)*
Haematopus longirostrus (Pied Oystercatcher)*
Ixobrychus flavicollis (Black Bittern)
Melanodryas cucullata cucullata (Hooded Robin)*
Melithreptus gularis gularis (Black-chinned Honeyeater) eastern subspecies
Neophema pulchella (Turquoise Parrot)
Ninox connivens (Barking Owl)
Ninox strenua (Powerful Owl)
Oxyura australis (Blue-billed Duck)*
Pandion haliaetus (Osprey)**
Pomatostomus temporalis temporalis (Grey-crowned Babbler) eastern subspecies*
Ptilinopus superbus (Superb Fruit-dove)**
Pyrrholaemus sagittata (Speckled Warbler)*
Stagonopleura guttata (Diamond Firetail)*
Stictonetta naevosa (Freckled Duck)*
Tyto tenebricosa (Sooty Owl)
*Tyto novaehollandiae (*Masked Owl)

Tyto capensis (Grass Owl)* above

Mammals

Cercartetus nanus (Eastern Pygmy-Possum)
Chalinolobus dwyeri (Large-eared Pied Bat)
Dasyurus maculatus (Spotted-tailed Quoll)
Falsistrellus tasmaniensis (Great Pipistrelle)*
Miniopterus schreibersii oceanensis (Eastern Bent-wing Bat)
Mormopterus norfolkensis (Eastern Freetail-bat)
Myotis adversus (Large-footed Myotis) below

Petaurus australis (Yellow-bellied Glider)
Petaurus norfolcensis (Squirrel Glider)*
Phascolarctos cinereus (Koala)
Pteropus poliocephalus (Grey-headed Flying Fox)
Saccolaimus flaviventris (Yellow-bellied Sheathtail Bat)
Scoteanax rueppellii (Greater Broad-nosed Bat)

Plants

Ancistrachne maidenii
Callistemon linearifolius

Darwinia biflora below

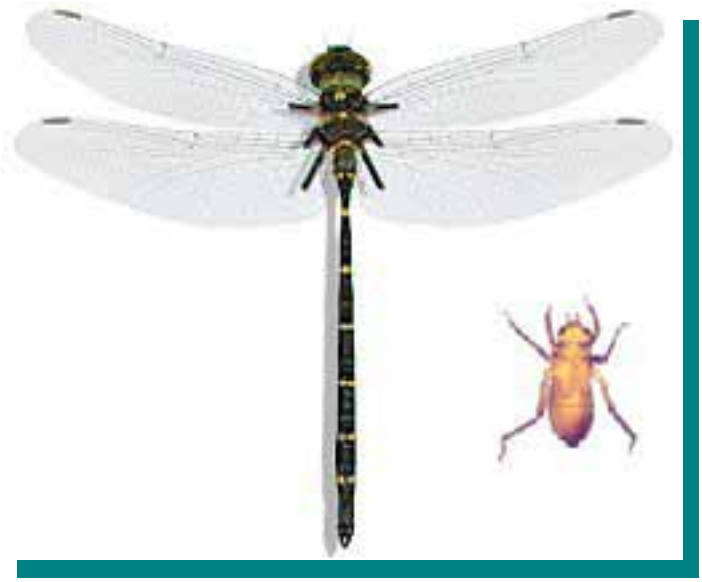
Darwinia peduncularis
Epacris purpurascens var. *purpurascens*
Eucalyptus camfieldii
(Heart-leaved Stringybark, Camfield's Stringybark) below

Genoplesium baueri (an orchid)
Haloragis exalata subsp. *exalata*
Kunzea rupestris (Rock Kunzea)

Lasiopetalum joyceae
Leptospermum deanei
Melaleuca deanei
Micromyrtus blakelyi
Olearia cordata
Pimelea curviflora var. *curviflora*
Syzgium paniculatum
Tetratheca glandulosa

Fisheries Management Act, 1994
Schedule 5: Vulnerable Species
Invertebrates

*Archaeophya adamsi (*Adams Emerald Dragonfly) below



Records are based on NPWS Wildlife Atlas, Australian Museum Records, Cumberland Bird Observers Club records, Hornsby Shire Threatened Biota Conservation Plan (1999) and NSW Scientific Committee Listings.

Appendix 3: Regionally and Locally Significant Species and Communities in the Hornsby Shire Other Than Threatened Species

Regionally or Locally Significant Fauna Species

Scientific Name	Common Name	Notes
Meridolum duralensis	land snail	Occurs west of Berowra Ck; may be assoc. with Sydney Turpentine-Ironbark Forest or Shale/Sandstone Transition Forest; declined in abundance. Found at Cowan.
Meridolum middenensis	land snail	Occurs east of Berowra Ck; assoc. with middens; declined in abundance.
Hydromys chrysogaster	Water Rat	Rare in Shire; few records from Cowan Ck and Marramarra Ck.
Myotis adversus	Large-footed Myotis	Maternal roosting colony at Galston. Largest known colony in Sydney.
Ornithorhynchus anatinus	Platypus	Rare; recorded from Ku-ring-gai Chase NP and Muogamarra NR.
Pseudomys novaehollandiae	New Holland Mouse	One record since 1980. NPWS database. Likely to be fire sensitive.
A.swainsonii	Dusky Antechinus	One record in Cowan in 2006 is the first record for Hornsby. Only other Sydney records are near Mona Vale Rd near Forest Way, Mc Carrs Creek Rd and Dendrobium Crescent Elanora Hts. Also records from lower Blue Mtns and Bouddi Peninsula.
Sminthopsis murina	Common Dunnart	Waitara Ck is one of few metropolitan records.
Vombatus ursinus	Wombat	NPWS database, Marramarra
Litoria caerulea	Green Tree Frog	Records from Wisemans Ferry & KCNP in 50's & 60's; declined throughout Sydney.
Litoria lesueurii	Lesueur's Tree Frog	Rare in Shire, most recent record Mount Colah in 1971.
Litoria jervisensis	Jervis Bay Tree Frog	Unusual form of Jervis Bay Tree Frog found Old Northern Road Glenorie.; uncertain taxonomy; few records of species in Shire.
Pseudophryne bibronii	Brown Toadlet	Few recent records in Sydney; significant if present
Acanthophis antarcticus	Common Death	NPWS database

	Adder	
Anomalopus swansoni	Worm skink	Northern Sydney is southern limit; only record from Muogamarra Nature Res
Boiga irregularis	Brown Tree Snake	Sydney is southern limit of distribution; populations are scattered and localised; Hornsby Heights only recent record (98).
Pogona barbata	Bearded Dragon	Few records in Shire; less common due to predation by cats and foxes.
Tympnocryptis diemensis	Mountain Dragon	Uncommon in Sydney; found 1999 Smugglers Ridge; previous records Mt Colah, Mt Kuring-gai and Asquith.
Underwoodisaurus milli	Thick tailed Gecko	Sydney is southern coastal limit of distribution; found Marramarra Ridge 1999, Arcadia Valley, Berowra Valley RP.
Alectura lathami	Australian Brush Turkey	Rare in Shire; one resident male Cowan; sightings Asquith (83), Normanhurst and Pennant Hills (94).
Aquila audax	Wedgetail Eagle	Naturally rare. NPWS database.
Origma soliaria	Rock Warbler	Considered common in Berowra Valley RP but has disappeared from Lane Cove River Valley.

Sources:
ESP Ecological Surveys and Planning P/L 1999 Hornsby Shire Threatened Biota Conservation Plan, Paul Burcher (pers. comm.), Jackie Recsei, Greg Daley, Brad Law and Actinotus Environmental Consultants

Regionally or Locally Significant Plant Species

Species found at 1 or 2% sites in LGA that are in danger of becoming extinct within 20 years

Scientific Name	Common Name	Notes (source)
Abrophyllum ornans		Lorna Pass Thornleigh Lane Cove NP
Acacia binervia		Singleton Rd Laughtondale
Acacia brownii		Laughtondale Gully Rd Maroota, Mambara track LCRNP Pennant Hills
Acacia buxifolia var. buxifolia		Stewart Rd Hornsby
Acacia bynoeana		Maroota Historical Site, Canoelands Rd Canoelands
Acacia echinula		Laughtondale Gully Rd Maroota, Nth Epping LCRNP
Acacia filicifolia		Duckponds Ridge firetrail Marramarra Ck
Acacia hispidula		Uncommon in Shire. Threatened by habitat loss (ridgetops & upper slopes) & by altered fire regimes. Canoelands firetrail Marramarra, Arcadia Pk Arcadia, Flinders Rd firetrail Mt Colah. Peebles Road.
Acacia juncifolia var. *juncifolia*		Extremely rare in the Shire & rare in greater Sydney. Crosslands record out of known range (Id by RBG)
Acacia mearnsii		Stewart Ave firetrail Hornsby
Acacia obtusifolia		Canoelands Ridge firetrail, Laughtondale Gully Rd Maroota
Acacia parvipinnula		Thornleigh Oval Thornleigh
Acacia prominens	Gosford Wattle	2RCa. Two specimens on fire trail off Stewart Ave, Hornsby confirmed by RBG.

Acacia rubida		One very old natural record from Asquith. Presumed extinct in the Shire. Found at 2 sites in Baulkham Hills Shire.
Acacia stricta	Hop Wattle	Depleted habitat/ sparse in Sydney Region. Now rare in the Sydney Region due to extensive habitat loss & degradation. Assoc. with BGHF, STIF & SSTF. Nth Epping Pennant Hills Pk, Stewart Rd firetrail Hornsby, Lorna Pass LCRNP, Mills Pk Asquith, Berkeley Cl Berowra to Berowra Waters
Adiantum formosum		Large colony at Plympton Rd, Beecroft & Devlins Ck Res Beecroft
Alectryon subcinereus		Devlins Ck Res Beecroft, Singleton Mill Rd
Amperea xiphoclada var. *papillata*		3RC (Rare or Threatened Australian Plant- ROTAP). Primary threat appears to be habitat loss & related non-detection in impact assessment as ID is difficult & is rarely taken beyond species level. Callicoma Walk Cherrybrook, Crosslands, Coba Ridge firetrail Fiddletown, Arrionga Pl Hornsby, Barrington Drv Dural
Aotus ericoides		Arcadia Pk Arcadia, Glendale Rd Cowan to Field Station
Apium prostratum var. filiforme		Crosslands
Arthropodium milleflorum		Observatory Pk Pennant Hills, Thornleigh Tip
Arthropteris tenella		Berowra
Asplenium australasicum		Lyrebird Gully, Mt Kuring-gai & Callicoma Walk, Cherrybrook. Marramarra Creek.
Asterolasia elegans		Laughtondale Gully Rd Maroota
Austrodanthonia induta		Berowra.
Austromyrtus tenuifolia	Narrow-leaf Myrtle	Risk from development pressures. Long term viability may be threatened by competition from exotics eg Crofton weed in nutrient enriched creeks eg Devlins Ck, Lane Cove River. Locally endemic, restricted to Sydney area. Duckponds Ridge firetrail Marramarra, Galston Gorge, Callicoma Walk Cherrybrook BVRP, Arcadia Pk Arcadie, 126-128 Bay Rd Berrilee, Larool Ck Thornleigh, Lyrebird Gully Mt Kuring-gai, Berkeley Cl Berowra to

		Berowra Waters, Jerusalem Bay KCNP, Devlins Ck Res Beecroft, Bellamy St Pennant Hills entrance to BVRP, Joe Craft's Ck Berowra Valley RP
Austrostipa ramosissima *A. verticillata*	Stout Bamboo Grass Slender Bamboo Grass	Very rare & threatened in the Shire & across greater Sydney due to extensive habitat loss & degradation. Only found in endangered shale & riverflat communities. In Marramarra Ck in SCESFC.
Baumea acuta		Gooraway Pl Berowra firetrial Berowra
Baumea nuda		Quarry Rd firetrial Dural
Baumea rubigniosa		Bujwa track Muogamarra NR
Bertya brownii		2 RC-. Western limit in Hornsby Shire. Population believed to be a single record that cannot be relocated. Presumed locally extinct.
Blandfordia grandiflora		Quarry Rd firetrail Dural
Blechnum ambiguum		Uncommon in Shire & in metro Sydney. 3 sites – Laughtondale Gully Rd Maroota, Devlins Ck track in Pennant Hills Pk & Donnybrook Bay in Marramarra NP.
Blechnum camfieldii		Laughtondale Gully Rd, Maroota, Devlins Ck Track, Pennant Hills Pk
Blechnum indicum		Singleton Rd, south
Blechnum wattsii		Jerusalem Bay, Cowan Ck, KCNP
Boronia floribunda	Pale Pink Boronia	Uncommon in Sydney Region, restricted to Open Forest in & around the Pennant Hills area in the Hornsby Shire. Main threat may be natural rarity combined with habitat loss & fragmentation, & changed fire regime. Pennant Hills Pk Ridge track, Refuge Rock Cherrybrook, Gooraway Pl Berowra Marramarra, Quarry Rd firetrail Dural BVRP, Bluegum Walk Hornsby, Mt Kuring-gai Industrial Area.
Boronia fraseri	Fraser's Boronia	2Rca (ROTAP). Naturally rare but at risk from changed fire regimes & weed invasion. In SSGF in Muogamarra NR & Marramarra NP. Duckponds Ridge firetrail Marramarra,

		Jerusalem Bay KCNP, Appletree Bay to boardwalk KCNP
Boronia rigens		Quarry Rd firetrail Dural BVRP, Pennant Hills Pk Ridge track, Dusthole Ridge firetrail Berrillee
Bossiaea rhombifolia		Duckponds Ridge firetrail Marramarra
Bossiaea stephensonii		Duckponds Ridge firetrail Marramarra, Canoelands Rd firetrail Marramarra
Bothriochola macra		Observatory Pk, Pennant Hills.
Boronia serrulata		2RC-. Dusthole Ridge firetrail Berrilee, Gooraway Pl Berowra. Marramarra NP. Muogamarra NR east side of Western Trail, Cowan.
Brachycome angustifolia var. heterophylla		Laughtondale Gully Rd, Maroota
Calandrinia pickeringii		Berowra Waters. Marramarra Creek.
Bulbophyllum shepherdi		Long Island
Callipedium spicigerum		Berkeley Cl to Berowra Waters.
Callistemon linearifolius		Porto Ridge Brooklyn, Canoelands Firetrail Marramarra
Callitris rhomboidea		Lonsdale Rd firetrial Berowra
Calochilus robertsonii		Jerusalem Bay KCNP
Calystegia marginata		Devlins Ck Res, Beecroft.
Carex appressa		Brooklyn Boarwalk, Marramarra NP
Carex breviculmis		Observatory Pk Pennat Hills
Carex inversa		Devlins Ck Res Beecroft, Plympton Rd Res Beecroft
Cassinia cunninghamii		Redgum Ave firetrail, Pennant Hills
Cassinia longifolia		Canoelands firetrail, Marramarra
Cassinia uncata		Laughtondale Gully Rd, Maroota
Centipeda minima		Galston Gorge. Plympton Rd, Beecroft.
Centrolepis fascicularis		Creek junction in 29 Bay Road, Berrilee

Chamaesyce dallachiana		Observatory Pk, Pennant Hills
Chenopodium glaucum		Crosslands
Chiloglottis reflexa		Berowra
Chloanthes stoechadis		Mt Kuring-gai to Appletree Bay. Benowie Track, Westleigh. Marramarra, Fagan Ridge.
Christella dentata		Uncommon in Shire. At Mt St Benedicts College, Devlins Ck, Berowra Valley RP, Flinders Rd firetrail Mt Colah, Mills Pk Asquith, Larool Ck Thornleigh, Lyrebird Gully Mt Kuring-gai, Arrionga Pl Hornsby, Berkelely Cl Berowra track. to Berowra Waters, Callicoma Walk Cherrybrook, Devlins Ck Res Beecroft, Barrington Drv Georges Ck Dural.
Chrysocephalum semipapposum		Laughtondale Gully Rd dam, Maroota
Cleistochloa rigida		Muogamarra NR, end of Western Trail, Cowan
Comesperma sphaerocarpum		Quarry Rd firetrail BVRP (one plant seen). Gully near E boundary Hornsby Model Engineers property.
Comesperma volubile		Lorna Pass Thornleigh LCRNP, Jerusalem Bay track KCNP, Devlins Ck Res Beecroft, University Field Station Cowan Muogamarra NR. Long Island.
Conospermum ericifolium		Gooraway Pl Berowra, Bujwa track Muogamarra NR
Correa reflexa		Callicoma Walk Cherrybrook BVRP, LCRNP, Devlins Ck track
Corybas fimbriatus		Berowra Waters, Quarry Rd Dural, Arcadia Pk
Crassula sieberiana		Bujwa Walk, Muogamarra. Laughtondale Gully Rd, Maroota. Muogamarra NR, end of Western Trail. Marramarr NP. Long Island.
Cyperus imbecillis		Callicoma Walk Cherrybrook, Devlins Ck Res Beecroft, Singleton Rd south
Cyperus gracilis		Devlins Ck Res Beecroft
Cyperus laevis		Berkeley Cl track Berowra to Berowra Waters, Devlins Ck Res Beecroft, Old Mans Valley Hornsby

Cyperus lucidus		Crosslands
Cyperus sanguinolentis		Callicoma Walk Cherrybrook, Arcadia Pk
Dampiera scottiana		Naturally rare in the Shire, disjunct Northern limit. Threatened by altered fire regimes & fire trail maintenance. 2 sites on Fagan Ridge at Marramarra, Duckponds Ridge firetrail Marramarra, Smugglers Ridge firetrail Marramarra. Forest Glen track.
Darwinia procera		2Rca (ROTAP). Threatened by habitat loss but primarily at risk from changed fire regimes & recreational impacts at some sites. Berowra Valley RP, KCNP (Mt Kuring-gai) & 1 site in Muogamarra NR in SSGF, Jerusalem Bay KCNP, Mt Kuring-gai Oval, below Barnett's lookout, Berowra
Davallia solida var. pyxidata		Lyrebird Gully, Mt Kuring-gai
Deparia petersenii ssp. *Congrua*		126-128 Bay Rd, Berrilee
Deyeuxia quadriseta		Pennant Hills Pk.
Dichelachne crinata		Callicoma Walk, Cherrybrook. Arcadia Pk, Arcadia.
Dichelachne micrantha		Laughtondale Gully Rd, Maroota.
Dicranopteris linearis var. *linearis*		Now rare. Canoelands firetrail Marramarra, Turner Rd firetrail Berowra, Flinders Rd firetrail Mt Colah, Porto Ridge Brooklyn
Dictymia brownii		Marramarra Creek
Digitaria diffusa		Lorna Pass, Pennant Hills Pk, Thornleigh. Berkeley Cl, Berowra to Berowra Waters.
Digitaria ramularis		Larool Ck, Thornleigh.
Dillwynia acicularis		Naturally rare in the Shire. Eastern limit. Threatened by habitat loss & changed fire regime. Known from Duckponds Ridge firetrail, Marramarra NP.
Dillwynia parvifolia		Glenorie Pk
Dipodium roseum		Porto Ridge track, Brooklyn. Larool Ck, Thornleigh.
Dipodium variegatum		Rare in Shire. Routinely misidentifies as *D. punctatum.* Known from Observatory Pk,

		Pennant Hills.
Dodonaea camfeildii		Canoelands / Gentleman's Halt trail
Dodonaea multijuga		On creek flats on Marramarra Ck nr Marramarra Ridge firetrail from Bloodwood Road Fiddletown. Rare in Sydney Region.
Doodia linearis		Appletree Bay, Bobbin Head & Plympton Rd, Beecroft
Doryanthes excelsa		Duckponds Ridge firetrail. Laughtondale Gully Rd Maroota. Marramarra Creek.
Doryphora sassafras		Joes Mountain Old Man Valley Hornsby
Duboisea myoporoides		Marramarra Creek off Duckponds Ridge track
Einadia nutans		Devlins Ck Res, Beecroft.
Einadia trigonos		Crosslands
Epacris crassifolia		Uncommon in Shire. Naturally rare in the area. Jerusalem Bay track, Cowan NCNP. Turner Rd Firetrail, Berowra. Flinders Rd firetrail, Mt Colah. Heather Pl to Waninga Rd firetrail Hornsby Heights. Berowra Waters Rd.
Epaltes australia		Callicoma Walk, Cherrybrook. Crown Res south of "The Mill".
Eragrostis leptostachya		Berkeley Cl, Berowra to Berowra Waters. Crosslands. Marramarra NP.
Eragrostis trachycarpa		Gooraway Pl, Berowra.
Eriochilus autumnalis		Berowra Heights
Eucalyptus acmenoides	White Mahogany	Rare in the Shire & near Southern limit. At risk & further threatened due to extensive loss, fragmentation & degradation of habitat. Assoc. with STIF. Plympton Ck Beecroft opp Scout Hall, Fagan Pk Arcadia
Eucalyptus agglomerata	Blue-leaved Stringybark	Naturally rare in the Shire. Some threat from habitat loss & changed fire regime. Assoc. with SSTF near Old Northern Rd & with rare diatreme communities in Arcadia. Duckponds Ck firetrail end Marramarra, Laughtondale Gully Rd, Maroota
Eucalyptus beyeriana		Singleton Rd south
Eucalyptus burgessiana ssp.		Extremely rare unclassified subtaxon of ROTAP. *E. burgessiana* found only in Blue

nov "Berowra"		Mountains. Single pop'n known only from former Landcom development proposal in Berowra. Threatened by small population size, isolation & changed fire regime.
Eucalyptus camfieldii		Quarry Rd firetrail Dural BVRP, Stewart Rd firetrail Hornsby, King St Mt Kuring-gai, Kuring-gai Chase Rd, Mt Colah, Arrionga Pl Hornsby
Eucalyptus capitellata	Brown Stringybark	Now restricted to localised populations, uncommon. Western limit in Hornsby Shire. A primarily coastal species. Threatened by loss & degradation of ridgetop habitat, especially along F3 & northern rail corridors.
Eucalyptus globoidea	White Stringybark	Rare in the Shire but threatened by extensive habitat loss & degradation. Strongly assoc. with STIF & SSTF. Duckponds Ridge firetrail Marramarra, Thornleigh Oval Pennant Hills Pk
Eucalyptus luehmanniana	Yellow-top Ash	2Rca (ROTAP). Naturally rare but threatened by loss of ridgetop & upper slope habitat, & by changed drainage. Very rare in the Shire & at Western limit. Sites at KCNP, Muogamarra NR, Berowra Valley RP, Turner Rd firetrail Berowra, Waninga Rd firetrail Hornsby
Eucalyptus multicaulis	Whipstick Mallee Ash	Rare in the Sydney Region & very rare in the Shire. Primary threats are ridgetop habitat loss. Refuge Rock, Trevors Lane Cherrybrook.
Eucalyptus notabilis	Blue Mountains Mahogany	Naturally rare in the Shire. Eastern limit for this primarily Blue Mountains species. Threatened by loss of ridgetop habitat. Assoc. with SSTF & STIF. 1 site at Marramarra NP.
Eucalyptus robusta	Swamp Mahogany	Rare & threatened in the Shire & in greater Sydney. Part of two listed endangered ecological communities (SCRFF & SCESF). Known habitat for at least 10 spp. of threatened fauna. Brooklyn boardwalk, Singleton Rd Laughtondale
Eucalyptus saligna	Sydney Blue Gum	Individual remnant Blue Gum High Forest trees are often the only remaining example of the community in urban areas & should be retained unless structurally dangerous & a threat to life or property. Should be replaced by 5 or 10 per tree removed where possible. 1 record in Muogamarra NR.

Eucalyptus sieberi	Black or Silvertop Ash	Western limit on Hornsby Plateau – at Blake Ridge in Marramarra NP, Quarry Rd firetrail Dural BVRP, Stewart Ave Hornsby, Flinders Rd firetrail Mt Colah, Mills Pk Asquith, Dusthole Ridge firetrail Berrilee, Turner Rd firetrail Berowra, Harwood Ave Mt Kuring-gai, Berkeley Cl Berowra to Berowra Waters
Eucalyptus squamosa	Scaly Bark	Rare. Former "R" (ROTAP). Threatened by ridgetop habitat loss & severe reproductive problems. Duckponds Ridge firetrail Marramarra, Quarry Rd Dural, BVRP, Canoelands Ridge firetrail Marramarra, Maroota HS, Coba Ridge firetrail Marramarra, Turner Rd firetrail Berowra Marramarra, Lonsdale Rd firetrail Berowra, Dusthole Ridge firetrail Berrilee, Gooraway Pl Berowra, Harwood Ave Mt Kuring-gai firetrail, Appletree Bay to Mt Colah track middle section, Jerusalem Bay track KCNP.
Eucalyptus tereticornis		Singleton Rd Laughtondale
Exocarpos stricta		Maroota Historic Site
Fimbristylis dichotoma		Gooraway Pl firetrail Berowra
Gahnia melanocarpa		Crosslands to Calna Ck Track, Appletree Bay to Mt Kuring-gai track
Gahnia microstachya		Appletree Bay to Mt Kuring-gai track. Track from Forest Glen NE to transmission towers
Genoplesium fimbriatum		Quarry Rd firetrail Dural, Gooraway Pl Berowra, Refuge Rock Walk Cherrybrook.
Glochidion ferdinandi var *pubescens*	Hairy Cheese Tree	Uncommon in the Shire & across greater Sydney. Arguably endangered in the Region due to severe habitat loss & degradation. Strongly assoc. with SCRFF but can occur on STIF & SSTF. Singleton Rd Laughtondale
Gonocarpus salsaloides		3Rca (ROTAP). Threatened by loss of ridgetop habitat & climate change – dependent on very localised moisture in otherwise relatively dry situations.
Goodenia paniculata		Gooraway Pl firetrail Berowra
Gratiola peruviana		Larool Ck Thornleigh
Haemodorum corymbosum		Quarry Rd firetrail Dural
Hakea bakeriana		Southern limit but not uncommon in Marramarra NP & Muogamarra NR, Canoelands

		firetrail Marramarra NP
Helichrysum elatum		Larool Ck Thornleigh
Helichrysum rutidolepis		Devlins Ck Res Beecroft
Helichrysum scorpioides		Thornleigh Tip, Observatory Pk Pennant Hills.
Hemarthria uncinata		Quarry Rd firetrail, Dural.
Hibbertia nitida	Shining Guinea Flower	2RC- (ROTAP). Threatened by habitat loss & degradation including weed invasion & changed fire regime.
Hibbertia scandens		Old Man Valley, Hornsby. Callicoma Walk, Cherrybrook.
Hydrocotyle geraniifolia	Forest Pennywort	Uncommon in the Shire. Laughtondale Gully Rd, Maroota.
Hypolepis glandulifera		Pennant Hills High School & Chilworth Res, Beecroft
Hypoxis hygrometrica		Observatory Pk Pennant Hills
Isolepis cernua		Crosslands, Muogamarra NR (1 site)
Isolepis nodosa		Dangar Island, Brooklyn Boardwalk, Muogamarra NR (1 site)
Juncus homalocaulis		Devlins Ck Res Beecroft
Kunzea ericoides		Singleton Rd Laughtondale
Lagenifera stipitata		Berkeley Cl, Berowra to Berowra Waters
Lasiopetalum macrophyllum		Duckponds Ridge firetrail Marramarra, Lyrebird Gully Mt Kuring-gai BVRP
Lepidosperma elatius		Jerusalem Bay track KCNP, Bujwa track Muogamarra NR
Leptocarpus tenax		Gooraway Pl, Berowra.
Leptospermum grandifolium		Rare & threatened by habitat loss & degradation of riparian & peri-riparian environments through urban runoff & weed invasion. Crosslands, Callicoma Walk Cherrybrook BVRP, Canoelands firetrail Marramarra NP
Leptospermum juniperinum		Gooraway Pl Berowra
Leptospermum laevigatum		Stewart Rd firetrail Hornsby

Leptinella longipes		Singleton Rd south
Lepyrodia muelleri		Hornsby Heights
Leucopogon amplexicaulis		Western limit in Hornsby Shire & naturally rare in region. Heather Pl. to Waninga Rd firetrail Hornsby, Glenview Rd Mt Kuring-gai, Canoelands Rd Marramarra NP, 126-128 Bay Rd Berrilee, Flinders Rd firetrail Mt Colah, Gooraway Pl Berowra, Lyrebird Gully Mt Kuring-gai, Berkeley Cl Berowra
Linum marginale		Glenorie Pk Glenorie
Livistona australis		Marramarra Creek
Lobelia gracilis		Pennant Hills High School
Logania pusilla		Generally restricted to Lucas Heights soil landscape, rare in the Sydney Region. Threatened by severe habitat loss & non-detection in impact assessments. Known from Muogamarra NR. Difficult to survey. Laughtondale Gully Rd Maroota, Bujwa track Muogamarra NR, Duckponds Ridge firetrail Mt Kuring-gai, Berkeley Cl track Berowra to Berowra Waters, Devlins Ck Res Beecroft, Quarry Rd Dural firetrail Marramarra
Lomandra brevis	Tufted Mat-rush	2RC- (ROTAP). Primary threat is loss of ridgetop habitat & non-detection in impact assessments. Difficult to survey. Bujwa track Muogamarra NR, Callicoma Wlk Cherrybrook, Glenview Rd Mt Kuring-gai, Quarry Rd firetrail Dural, Coba Ridge firetrail Fiddletown, Appletree Bay KCNP, 126-128 Bay Rd Berrilee, Stewart Rd Hornsby, Lonsdale Rd firetrail Berowra, Dusthole Ridge firetrail Berrilee, Turner Rd Firetrail Berowra, Gooraway Pl firetrail Berowra.
Lomandra fluviatilis		3Rca (ROTAP). Threatened by widespread & often severe habitat degradation assoc. with urban runoff & weed invasion. Known from McKell Pk & Fishponds Berowra Valley RP. Marramarra Creek.
Lycipodiella cernua		Flinders Rd firetrail Mt Colah (largish colony) & Berowra Water Rd Berowra
Lycipodiella lateralis		Lonsdale Rd firetrail Berowra (few scattered plants) & Flinders Rd firetrail Mt Colah (few

		scattered plants)
Lycopus australis		Brooklyn Boardwalk
Lyperanthus suaveolens		Pennant Hills Pk, North Epping.
Macrozamia communis		Long Island
Macrozamia elegans	Cycad	Known from Duckponds Ridge firetrail Marramarra NP (only other known population at Mountain Lagoon Blue Mtns Id by RBG – uncertain taxonomy needs further collection & study). Fiddletown Creek.
Melaleuca armillaris		Lonsdale Rd firetrail Berowra
Melaleuca ericifolia		Singleton Rd Laughtondale
Melaleuca linearifolia		Singleton Rd Laughtondale
Melaleuca quinquenervia		Brooklyn Boardwalk
Melaleuca styphelioides		Singleton Rd Laughtondale, Devlins Ck track Pennant Hills Pk
Mirbelia speciosa		Naturally rare in Shire but significantly threatened by loss of ridgetop habitat. Rare & threatened in greater Sydney. Strongly assoc. with SSTF & nearby sandstone ridgetop communities. Known from Fagan Ridge & NE of Maroota, Old Northern Rd Canoelands
Monotaxis linifolia		Jerusalem Bay track KCNP
Myoporum acuminatum	Mangrove Boobialla	Naturally rare in Shire but threatened by degradation of endangered riverflat & estuarine environments. Singleton Rd south
Olearia viscidula		Devlins Ck Res Beecroft
Omphacomeria acerba		Duckponds Ridge firetrail Marramarra, Berkeley Cl Berowra to Berowra Waters BVRP
Opercularia diphylla		Thornleigh Tip, Duckponds Ridge firetrail Marramarra
Orthceras strictum		Quarry Rd Firetrail, Dural.
Oxylobium ilicifolium (syn. Podolobium)		Laughtondale Gully Rd Maroota
Passiflora cinnabarina		Singleton Rd Laughtondale, Callicoma Walk Cherrybrook, Crosslands to Calna Ck

		Berowra Ck, Plympton Bush Res Beecroft
Passiflora herbertiana		Crosslands to Calna Ck Berowra Ck
Patersonia sericea (terete leaf)		Bujwa track Muogamarra NR, Canoelands firetrail, Gooraway Pl Berowra
Pelargonium inodorum		Chilworth Res Beecroft
Persicaria hydropiper		Flinders Rd firetrail Mt Colah
Phebalium squameum		Galston gorge BVRP
Phragmites australia		Lyrebird Gully Mt Kuring-gai, Brooklyn, Singleton Rd south.
Phylidrum lanuginosum		Laughtondale Gully Rd dam Maroota, Fagan Pk Arcadia.
Phyllanthus gunnii (syn. P.gasstroemii)		Singleton Rd Laughtondale
Plantago debilis		Old Man Valley Hornsby, Appletree Bay to boardwalk Cowan Ck
Platycerium bifurcatum		Callicoma Walk Cherrybrook. Lorna Pass Thornleigh. Long Island. Marramarra Creek.
Platysace clelandii		2Rca (ROTAP). Naturally rare. Assoc. with SSGF & NSF in Marramarra NP (Duckponds Ridge firetrail) & Muogamarra NR. Marramarra Creek. Collingridge Point. Calabash Creek.
Pleurosis rutidosis		Porto Ridge Brooklyn – one plant out of area
Polymeria calycina		Callicoma Walk Cherrybrook.
Polystichum australiense		Old Mans Valley Hornsby – one plant seen
Potamogeton tricarinatus		Galston Gorge.
Prasophyllum brevilabre		Malton Rd, North Epping Lane Cove NP. Wianamatta shale. Flowers after fire.
Prasophyllum patens		Hornsby Heights.
Prostanthera denticulata	Mintbush	Naturally rare in Shire. Single population known from near Cowan, Jersualem Bay track KCNP.
Prostanthera howelliae	Mintbush	Naturally rare in Shire. Threatened by small population size & proximity to Old Northern Rd. Occurs in SSTF & nearby & nearby sandstone communities. Duckponds Ridge

		firetrail Marramarra, Redgum Ave firetrail Pennant Hills.
Prostanthera incisa		Lyrebird Gully Mt Kuring-gai
Prostanthera scutellarioides		Mt Colah
Pteris vittate		Rare (Flora NSW, occurs on Aboriginal middens & mortar – man made sites) Laughtondale Gully Rd Maroota, Callicoma Walk Cherrybrook, Larool Ck Thornleigh, Gooraway Pl firetrail Berowra, Berekeley Cl Berowra track to Berowra Waters, Appletree Bay track KCNP, Devlins Ck track Pennant Hills Pk
Pterostylis curta		Lorna Pass Pennant Hills Pk, Appletree Bay KCNP.
Pterostylis daintreana		Gooraway Pl firetrail Berowra, Barrington Drv Dural.
Pterosytlis pedoglossa		Gooraway Pl firetrail Berowra
Pultenaea hispidula		Malton Rd Nth Epping near LCNP
Pultenaea linophylla		Rare but further threatened by loss of ridgetop habitat. Bujwa track Muogamarra NR, Hornsby Heights, Quarry Rd firetrail Dural, Galston Gorge, Stewart Ave firetrail Hornsby, Flinders Rd firetrail Mt Colah, Turner Rd firetrail Berowra, Gooraway Pl firetrail Berowra, Harwood Rd firetrail Mt Kuring-gai
Pultenaea polifolia		Rare but further threatened by loss of ridgetop habitat. Laughtondale Gully Rd Maroota, Duckponds Ridge firetrail Marramarra, Callicoma Walk Cherrybrook, Quarry Rd firetrail Dural, Canoelands Rd firetrail Marramarra, Maroota Historical Site, Stewart Rd firetrail Hornsby, Flinders Rd firetrail Mt Colah, Mills Pk Asquith
Pultenaea scabra var *biloba*		Rare in Shire & further threatened by loss of ridgetop habitat – not found in detailed survey of Muogamarra NR & Marramarra NP. Heather Cl to Waninga Rd Hornsby Heights, Old Northern Rd past Maroota
Pultenaea stipularis	Fine-leaf Bush-pea	Rare in Hornsby Shire.
Pultenaea viscosa		Redgum Ave Pennant Hills below creek

Pultenaea villosa		Fagan Pk Arcadia
Pyrrosia rupestris		Devlins Ck Beecroft, Lyrebird Gully Mt Kuring-gai & Singleton Rd south
Ranunculus plebeius		Callicoma Walk Cherrybrook
Rapanea howittiana		Singleton Rd south
Restio dimorphus		Lonsdale Rd firetrail Berowra
Restio fastigiatus		Lonsdale Rd firetrail Berowra, Gooraway Pl firetrail Berowra, Jerusalem Bay KCNP.
Rhodamnia rubescens		Larool Ck Thornleigh
Rimacola elliptica	Orchid	Record off fire trail at Merlin St Mt Colah – id unconfirmed (J West – resident)
Rulingia dasyphylla		Kulpas Track off Marramarra Ridge track
Sambucus gaudichaudiana		Galston Gorge BVRP
Samolus repens		Crosslands salt marsh, Appletree Bay KCNP
Schelhammera undulata		Jerusalem Bay track KCNP, Marramarra NP, Peats Crater Muogamarra NR.
Schizaea dichotoma	Branched Comb-fern	Rare but threatened by habitat loss & degradation. May be under recorded..
Schizaea rupestris		126-128 Bay Rd Berrilee, Laughtondale Gully Rd Maroota, Jerusalem Bay KCNP, Devlins Ck track Pennant Hills Pk. Marramarra NP.
Schizomeria ovata		Devlins Ck Res Beecroft, Plympton Rd Beecroft, Jerusalem Bay KCNP, Larool Ck Thornleigh.
Schoenus apogon		Hornsby Heights, Marramarra NP, Muogamarra NR
Schoenus moorei		Quarry Rd firetrial Dural
Schoenus paludosus		Gooraway Pl Berowra
Schoenus turbinatus		Duckponds Ridge
Sellaginella uliginosa		Lonsdale Rd firetail Berowra, Lyrebird Gully Mt Kuring-gai, Jerusalem Bay KCNP
Senecio bipinnatisectus		Uncommon in Shire. Sites at KCNP, Berowra Valley RP, Fagan Pk & Muogamarra NR. Vulnerable in Western Sydney (Benson & McDougall, 1991). Galston Gorge, Fagan Pk

		Arcadia.
Senecio diaschides		Laughtondale Gully Rd Maroota, Old Mans Valley Hornsby.
Senecio minimus		Galston Gorge to Crosslands
Senecio vellioides		Kulpas Track on steep descent to Cobah Ba
Spirodela punctata		Galston Gorge
Sprengelia incarnata	Pink Swamp Heath	Naturally rare in the Shire. Susceptible to threats from development & nutrient enriched runoff. Sites at KCNP (Mt Kuring-gai), Muogamarra. NR. Dependant on small hanging swamps on sandstone ridges around Berowra Valley RP. Jerusalem Bay track KCNP, Lonsdale Rd firetrail Berowra
Stackhousia monogyna		Laughtondale Gully Rd Maroota, Singleton Rd Laughtondale
Stellaria flaccida		Callicoma Walk Cherrybrook, Devlins Ck Res Beecroft, Marramarra NP.
Stipa densiflora		Observatory Pk
Stipa nodosa		Larool Ck Thornleigh, Observatory Pk Pennant Hills.
Stipa ramosissima		Singleton Rd south, Fearnley Pk Beecroft, Devlins Ck Res Beecroft.
Stipa rudis ssp. nervosa		Jerusalem Bay track KCNP.
Stipa verticillata		Berkeley Cl, Berowra to Berowra Waters.
Stypandra glauca		Laughtondale Gully Rd Maroota.
Styphelia longifolia		Devlins Ck Res Beecroft
Thelychiton gracilicaule		Big Bay Island
Thelychiton speciosus		Kulpas
Thelymitra pauciflora		Quarry Rd entrance to firetrail Dural.
Thysanotus juncifloius		Benowie Track Galston Gorge to Croosland, 126-128 Bay Rd Berrilee
Thysanotus tuberosus		Pennant Hills High, Arcadia Pk, Berkeley Cl Berowra track to Berowra Waters, 6 sites in Muogamarra NR & Marramarra NP
Tricostularia pauciflora		Quarry Rd firetrial Dural, Gooraway Pl Berowra

Triglochin striatum		Brooklyn Boardwalk
Tristania neriifolia	Water Gum	Naturally rare in the Shire & in greater Sydney but threatened by habitat loss & degradation. Known from KCNP, Berowra Valley RP, Lyrebird Gully Mt Kuring-gai, Appletree Bay to Mt Kuring-gai middle section
Tricoryne simplex		Callicoma Walk Cherrybrook, Pennant Hills High School
Typha sp.		Laughtondale Gully Rd dam Maroota.
Utricularia lateriflora		Jerusalem Bay KCNP
Vittadinia hispidula var. hispidula		Singleton Rd south
Wahlenbergia communis		North Epping LCNP
Wahlenbergia littoricola		Lorna Pass LCNP
Xyris gracilis		Stewart Ave Hornsby.
Xyris gracilis ssp. gracilis		Gooraway Pl Berowra
Xyris operculata		Jerusalem Bay track KCNP.

Sources: Benson & McDougall 1991 in Cunninghamia 3(4), Paul Burcher, Roger Lembit, Steve Douglas, Jenny Lewis, Pat Pike, Ross Doig, Noel Rosten, Gordon Limburg, Graham Dowden, Royal Botanic Gardens

Regionally or Locally Significant Vegetation Communities

Community	Notes
Vegetation of Regional Conservation Significance	**Communities on Volcanic Diatremes** • **Community J** Glen Forest – *E. saligna* Tall Open Forest - significant in Sydney Region due to very restricted distribution • **Community N** Glen Forest – *E. agglomerata – Angophora floribunda* Open Forest - significant in Sydney Region due to very restricted distribution **Communities on Hawkesbury Sandstone** • **Community B** *E. piperita – Angophora bakeri* Open Forest - not known from any major reserve, appears to be restricted to upper Colah Creek. • **Community O** Warm Temperate (Coachwood) Rainforest - poorly conserved in Sydney Region • **Community H Rock Platform Heath**– Small patches occur on suitable outcrops of Hawkesbury Sandstone; significant due to threatened plants associated with community esp. *Kunzea rupestris, Micromyrtus blakelyi, Darwinia biflora & Darwinia peduncularis*
Vegetation of Local Conservation Significance	**Communities on Hawkesbury Sandstone** • **Community E** *Eucalyptus seiberi- - C. gummifera- E. haemastoma* Woodland – becoming increasingly important as it occurs on flatter ridgetops and is being cleared for development. • **Community L** *E. pilularis – Angophora costata – Syncarpia glomulifera* Tall Open Forest– associated mainly with gullies, is less affected by clearing and is now the most extensive of the taller forest communities in Hornsby Shire. Small areas are within Ku-ring-gai Chase NP and Berowra Valley RP. The largest areas present are outside the major reserves. • **Community I Sandstone Swamp** – Only few mappable areas detected but occurs more extensively further east in Ku-ring-gai Chase NP. • **Community S** *Angophora costata – C. gummifera – E. umbra* Woodland– Restricted distribution to steep slopes near Hawkesbury River near Fishermans Point.

	Communities on Narrabeen Sediments • **Community P** *Eucalyptus pilularis – Angophora floribunda* Tall Open Forest - always limited in extent, this community has been much reduced by clearing of these fertile soils. Remnants at Crosslands, Dangar Island and potentially Marramarra Creek. • **Community R** *Angophora bakeri – E. punctata – E. tereticornis* Open Forest – restricted distribution along northern reaches of the River and more extensive outside Marramarra NP. • **Community Q** *Angophora floribunda – Allocasuarina torulosa* Open Forest due to its restricted distribution in Hornsby Shire **Communities on Marine Sediments** • **Community W** Mangroves - intertidal vegetation along Hawkesbury River, Marramarra and Berowra Creek to Wisemans Ferry. Important habitat.

Appendix 4: Nationally Significant Species and Communities Listed under the Environment Protection and Biodiversity Conservation Act 1999

* = potentially present in the Hornsby Shire; # = breeding may occur within area; ## = breeding is likely to occur within area , JAMBA= Japan Australia Migratory Bird Agreement; CAMBA = China Australia Migratory Bird Agreement

Source: Department of Environment and Heritage, Brooklyn Estuary Study, Actinotus Flora and Fauna Study of Bar Island

Animals

Birds

Accipiter cirrhocephalus (Collared Sparrowhawk)	Migratory
Accipiter fasciatus (Brown Goshawk)	Migratory
Accipiter novaehollandiae (Grey goshawk)	Migratory
Apus pacificus (Fork-tailed swift)	Migratory Listed Marine Species-overfly marine area
Ardeola ibis (Cattle Egret)	Migratory (CAMBA/ JAMBA) Listed Marine Species - overfly marine area
Cacatua pastinator pastinator (Long-billed Corella)	Migratory
Charadrius hiaticvla (Ringed Plover)	Migratory
Coracina tenuirostris melvillensis (Cicadabird (East coast ssp.)	Migratory
Cuculus saturatus (Oriental cuckoo)	Migratory
Diomedea antipodensis * (Antipodean Albatross)	Vulnerable Migratory (marine) Listed Marine Species
*?Diomedea exulans (*Wandering Albatross)	Migratory
Diomedea gibsoni * (Gibson's Albatross)	Vulnerable Migratory (marine) Listed Marine Species
Gallinago hardwickii (Latham's snipe)	Migratory (wetland) Listed Marine Species - overfly marine area
Haliaeetus leucogaster (White-bellied Sea-eagle)	Migratory (terrestrial) (CAMBA) Listed Marine Species
Hirundapus caudacutus (White-throated Needletail)	Migratory (terrestrial) (CAMBA/ JAMBA) Listed Marine Species - overfly marine area
Falco peregrinus fruitii (Peregrine falcon)	Migratory (JAMBA)
Falco peregrinus japanesis (Peregrine falcon)	Migratory
Lathamus discolor (Swift Parrot)	Endangered Listed Marine Species - overfly marine area
Lichenostomus melanops cassidix (Yellow tufted honeyeater)	Migratory
Limicola falcinellus (Broad-billed Sandpiper)	Migratory
*Macronectes giganteus (*Southern Giant-Petrel)	Endangered

	Listed Marine Species - overfly marine area Migratory (marine) (Bonn)
*Macronectes halli (*Northern Giant-Petrel)*	Vulnerable Listed Marine Species - overfly marine area Migratory (Bonn)
*Merops ornatus** (Rainbow Bee-eater)	Listed Marine Species - overfly marine area
Monarcha melanopsis# (Black-faced Monarch)	Migratory (terrestrial) Listed Marine Species - overfly marine area
Myiagra cyanoleuca## (Satin Flycatcher)	Migratory (terrestrial) Listed Marine Species - overfly marine area
Pandion haliaetus (Osprey)	Migratory
*Phoebetria fusca** (Sooty Albatross)	Migratory
*Pterodroma neglecta neglecta** (Kermadec Petrel (western))	Vulnerable
?Pterodroma solandri (Providence Petrel)	Migratory
*?Puffinus carneipes (*Flesh-footed Shearwater)	Migratory
?Puffinus tenuirostris (Short-tailed Shearwater)	Migratory
Rallus pectoralis clelandii (Lewin's Rail)	Migratory
Rhipidura rufifrons# (Rufous Fantail)	Migratory (terrestrial) Listed Marine Species - overfly marine area
*Rostratula australis** (Australian Painted Snipe)	Vulnerable
*Rostratula benghalensis s. lat** (Painted Snipe)	Migratory (wetland)
*Thalassarche bulleri** (Buller's Albatross)	Vulnerable Migratory (marine) Listed Marine Species - overfly marine area
*Thalassarche cauta** *(*Shy Albatross)	Vulnerable Marine Migratory (Bonn)
*Thalassarche impavida** (Campbell Albatross)	Vulnerable Migratory (marine) Listed Marine Species
*Thalassarche salvini** (Salvin's Albatross)	Vulnerable Listed Marine Species
*Thalassarche steadi** (White-capped Albatross)	Vulnerable Migratory (marine) Listed Marine Species
Xanthomyza phrygia (Regent Honeyeater)	Endangered Migratory (JAMBA)

Cartilaginous Fishes

*Carcharias taurus (east coast population) (*Grey Nurse Shark)	Critically Endangered
*Carcharodon carcharias (*Great White Shark)	Vulnerable

	Migratory marine (Bonn)
Rhincodon typus * (Whale Shark)	Vulnerable Migratory (marine)

Frogs

Heleioporus australiacus (Giant Burrowing Frog)	Vulnerable
Litoria aurea (Green and Golden Bell Frog)*	Vulnerable
*Litoria littlejohni** (Littlejohn's Tree Frog, Heath Frog)	Vulnerable
*Mixophyes balbus (*Stuttering Frog)*	Vulnerable
*Mixophyes iteratus** (Southern Barred Frog, Giant Barred Frog)	Endangered

Mammals

*Arctocephalus forsteri** (New Zealand Fur-seal)	Listed Marine Species
*Arctocephalus pusillus** (Australian Fur-seal, Australo-African Fur-seal)	Listed Marine Species
*Chalinolobus dwyeri (*Large-eared Pied Bat)	Vulnerable
Dasyurus maculatus maculatus (s. lat.) (Spotted-tail Quoll, Tiger Quoll (south-east mainland population)	Endangered
Isoodon obesulus obesulus (Southern Brown Bandicoot)	Endangered
*Petrogale penicillata (*Brush-tailed Rock-wallaby)*	Vulnerable
*Potorous tridactylus tridactylus (*Long-nosed Potoroo SE mainland)*	Vulnerable
Pteropus poliocephalus (Grey-headed Flying-fox)	Vulnerable

Ray-finned fishes

*Acentronura tentaculata** (Hairy Pygmy Pipehorse)	Listed Marine Species
*Festucalex cinctus** (Girdled Pipefish)	Listed Marine Species
Filicampus tigris (*Tiger Pipefish)	Listed Marine Species
Heraldia nocturna (*Upside-down Pipefish)	Listed Marine Species
*Hippichthys penicillus** (Beady Pipefish, Steep-nosed Pipefish)	Listed Marine Species
Hippocampus abdominalis (*Eastern Potbelly Seahorse, New Zealand Potbelly, Seahorse, Bigbelly Seahorse)	Listed Marine Species
*Histiogamphelus briggsii** (Briggs' Crested Pipefish, Briggs' Pipefish)	Listed Marine Species
*Hippocampus whitei** (White's Seahorse, Crowned Seahorse, Sydney Seahorse)	Listed Marine Species
*Lissocampus runa** (Javelin Pipefish)	Listed Marine Species
*Maroubra perserrata**(Sawtooth Pipefish)	Listed Marine Species
*Notiocampus ruber** (Red Pipefish)	Listed Marine Species
*Phyllopteryx taeniolatus** (Weedy Seadragon, Common Seadragon)	Listed Marine Species
*Prototroctes maraena * (*Australian Grayling)	Vulnerable
*Solegnathus spinosissimus** (Spiny Pipehorse, Australian Spiny Pipehorse)	Listed Marine Species
*Solenostomus cyanopterus** (Blue-finned Ghost Pipefish, Robust Ghost Pipefish)	Listed Marine Species
*Solenostomus paradoxus** (Harlequin Ghost Pipefish, Ornate Ghost Pipefish)	Listed Marine Species

*Stigmatopora argus** (Spotted Pipefish)	Listed Marine Species
*Stigmatopora nigra** (Wide-bodied Pipefish, Black Pipefish)	Listed Marine Species
*Syngnathoides biaculeatus** (Double-ended Pipehorse, Alligator Pipefish)	Listed Marine Species
*Trachyrhamphus bicoarctatus** (Bend Stick Pipefish, Short-tailed Pipefish)	Listed Marine Species
*Urocampus carinirostris** (Hairy Pipefish)	Listed Marine Species
*Vanacampus margaritifer** (Mother-of-pearl Pipefish)	Listed Marine Species
Reptiles	
*Chelonia mydas (*Green Turtle)	Vulnerable Listed marine species Migratory marine (Bonn)
*Dermochelys coriacea (*Leathery Turtle, Leatherback Turtle)	Vulnerable Listed marine species Migratory marine (Bonn)
Hoplocephalus bungaroides (Broad-headed Snake)*	Vulnerable
*Pelamis platurus** (Yellow-bellied Seasnake)	Listed Marine Species
Whales and Other Cetaceans	
*Balaenoptera edeni** (Bryde's Whale)	Migratory (marine) Cetacean Listed Species
Caperea marginata * (Pygmy Right Whale)	Migratory (marine) Cetacean Listed Species
Delphinus delphis * (Common Dolphin)	Cetacean Listed Species
Eubalaena australis ***(Southern Right Whale)	Endangered Cetacean Listed Species Migratory marine (Bonn)
Lagenorhynchus obscurus * (Dusky Dolphin)	Cetacean Listed Species Migratory marine
Megaptera novaeangliae * (Humpback Whale)	Vulnerable Cetacean Listed Species Migratory marine (Bonn)
*Stenella attenuata** (Spotted Dolphin, Pantropical Spotted Dolphin)	Cetacean
*Tursiops aduncus** (Spotted Bottlenose Dolphin)	Cetacean
*Tursiops truncatus s. str.** (Bottlenose Dolphin)	Cetacean
Plants	
Acacia bynoeana (Bynoe's Wattle, Tiny Wattle)	Vulnerable
Acacia gordonii	Endangered

Acacia pubescens * (Downy Wattle, Hairy Stemmed Wattle)	Vulnerable
Asterolasia elegans *	Endangered
Caladenia tessellata (Thick-lipped Spider-orchid, Daddy Long-legs)	Vulnerable
Cryptostylis hunteriana * (Leafless Tongue-orchid)	Vulnerable
Darwinia biflora	Vulnerable
Dillwynia tenuifolia *	Vulnerable
Eucalyptus camfieldii (Camfield's Stringybark)	Vulnerable
Grevillea parviflora subsp. *parviflora*	Vulnerable
Haloragis exalata subsp. *exalata* (Wingless Raspwort, Square Raspwort)	Vulnerable
Haloragodendron lucasii * (Hal)	Endangered
Kunzea rupestris	Vulnerable
Lasiopetalum joyceae	Vulnerable
Leptospermum deanei	Vulnerable
Melaleuca deanei (Deane's Melaleuca)	Vulnerable
Micromyrtus blakelyi	Vulnerable
Olearia cordata	Vulnerable
Persoonia hirsuta	Endangered
Persoonia mollis subsp. *maxima*	Endangered
Pimelea curviflora var. *curviflora*	Vulnerable
Tetratheca glandulosa	Vulnerable
Zieria involucrata	Vulnerable

Threatened Ecological Communities

Critically Endangered

Blue Gum High Forest of the Sydney Basin Bioregion

Turpentine-Ironbark Forest in the Sydney Basin Bioregion

Endangered

Shale/Sandstone Transition Forest

Register of the National Estate: Natural

Big Bay Marramarra Creek Area NSW

Hornsby Diatreme Area NSW

Ku-ring-gai Chase National Park (1980 boundary) NSW

Long Island Nature Reserve NSW

Muogamarra Nature Reserve NSW

Appendix 5: Community sustainability indicators for conserving biodiversity

THEME 1. PLANNING AND DEVELOPMENT DECISIONS BASED ON SUSTAINABLE VALUES

INDICATORS:

1.1 H: Areas of bushland and (agricultural land) lost to development (where loss of agricultural land is defined by conversion of agricultural land to unproductive use).

THEME 2. PRESERVE AND ENHANCE BUSHLAND AND BIODIVERSITY

INDICATORS:

2.1 H: Percentage of land in the Shire under the active care of the community and Council (Bushcare, Landcare, Friends of…, other community groups and Council contracts).

2.2 H: Area of representative ecological habitats in Hornsby Shire

2.3 S: Area of bushland categorised as good/average/poor

Appendix 6: Additional Schemes Supporting Nature Conservation on Private Land

Changes to Tax Laws

The Federal Government through Environment Australia has released guidelines and an application form for the new tax concession available for donations of property to environmental groups and for tax deductions for landholders who enter into conservation covenants. The concession is available to taxpayers who donate property (land, buildings, shares, vehicles, machinery etc) valued at over $5000 to eligible environmental bodies. Donors must obtain a valuation of the property from the Commissioner of Taxation through the Australian Valuation Office. Deductions may be apportioned over time, up to five years, so that tax benefits are not lost when a donor's income in a single year is less than the value of the gift.

The legislation provides for two types of tax concessions: an income tax deduction for any decrease in land value (where that decrease is over $5,000) as a result of entering into a conservation covenant, where the land owner receives no capital payment for entering into it; and Capital Gains Tax (CGT) treatment to any capital payment received for entering into a conservation covenant. A conservation covenant is defined as a covenant that restricts or prohibits the land owner from certain activities on the land that could degrade the environmental value of the land; is permanent and binding on current and future land owners; and is approved by the Federal Minister for the Environment and Heritage.

Voluntary Conservation Agreements

The National Parks and Wildlife Service offer assistance to landholders wishing to enter into a permanent property protection scheme. NPWS regional staff advise on wildlife and vegetation management and management plans for the property. Field days, newsletters and an annual site visit are also provided. Some funds are available for surveys and on-ground works such as fencing.

Wildlife Refuges

The National Parks and Wildlife Service offer assistance to landholders wishing to declare their property a wildlife refuge. NPWS staff provide property planning and management advice, networking with other landowners and notes. Assistance programs are offered to support the implementation of plans.

Land for Wildlife

The National Parks and Wildlife Service are piloting a scheme where landowners register their property as “land for wildlife”. NPWS staff

provide property planning and management advice, networking with other landowners and notes. Assistance programs are offered to support the implementation of plans.

Revolving Fund

The Nature Conservation Trust is commencing a program to purchase land of importance for the conservation of biodiversity, then subsequently place a covenant on the land to afford permanent protection, then on-sells the land to a sympathetic purchaser. Donations and gifts of land are tax deductible.

Appendix 7: Key Threatening Processes Listed under NSW Legislation

Schedule 3 Threatened Species Conservation Act, 1995

Alteration of habitat following long wall mining
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands
Bushrock removal
Clearing of native vegetation
Competition and grazing by the feral European Rabbit *Oryctolagus cuniculus* (L.)
Competition and habitat degradation by feral goats *(Capra hircus)*
Competition from feral honeybees *Apis mellifera* L.
Death or injury to marine species following capture in shark control programs on ocean beaches
Ecological consequences of high frequency fires
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments
Exotic vines and scramblers
Herbivory and environmental degradation caused by feral deer
Human-caused climate change
Importation of Red Imported Fire Ants *Solenopsis invicta* Buren 1972 into NSW
Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis
Infection of native plants by *Phytophthora cinnamomi*
Introduction of the large earth bumblebee, *Bombus terrestris*
Invasion and establishment of exotic vines and scramblers
Invasion and establishment of the Cane Toad (*Bufo marinus*)
Invasion, establishment and spread of Lantana (*Lantana camara* L. *sens. lat*)
Invasion of native plant communities by bitou bush and boneseed
Invasion of native plant communities by exotic perennial grasses
Invasion of the yellow crazy ant
Loss or degradation (or both) of sites used for hill-topping by butterflies
Predation by the plague minnow (*Gambusia holbrooki* Girard, 1859)
Predation by the European red fox *Vulpes vulpes* (Linnaeus, 1758)
Predation by the Feral Cat *Felis catus* (Linnaeus, 1758)
Predation by the ship rat on Lord Howe Island
Removal of dead wood, dead trees and logs

Schedule 6 Fisheries Management Act, 1994

Current shark meshing program in NSW waters
Hook and line fishing in areas important for the survival of threatened fish species
Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams
Introduction of non-indigenous fish and marine vegetation to the coastal waters of New South Wales.
The degradation of native riparian vegetation along New South Wales water courses
The introduction of fish to waters within a river catchment outside their natural range
The removal of large woody debris from New South Wales rivers and streams

Appendix 8: Key Threatening Processes Listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999

Listed Key Threatening Process Section 183

Competition and land degradation by feral Goats
Competition and land degradation by feral Rabbits
Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)
Incidental catch (bycatch) of Sea Turtle during coastal otter-trawling operations within Australian waters north of 28 degrees South
Incidental catch (or bycatch) of seabirds during oceanic longline fishing operations
Infection of amphibians with chytrid fungus resulting in chytridiomycosis
Injury and fatality to vertebrate marine life caused by ingestion of, or entanglement in, harmful marine debris
Land clearance
Loss of biodiversity and ecosystem integrity following invasion by the Yellow Crazy Ant (*Anoplolepis gracilipes*) on Christmas Island, Indian Ocean.
Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases
Predation by exotic rats on Australian offshore islands of less than 1000 km^2 (100,000 ha)
Predation by feral Cats
Predation by the European Red Fox (*Vulpes vulpes*)
Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs
Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species
The biological effects, including lethal toxic ingestion, caused by Cane Toads (*Bufo marinus*).
The reduction in the biodiversity of Australian native fauna and flora due to the red imported fire ant, *Solenopsis invicta* (fire ant)

Appendix 9: Draft Priority Actions Statement, Threat Abatement Plans, Recovery Plans and Critical Habitat Mapping under the NSW Threatened Species Conservation Act, 1995 and the Environment Protection and Biodiversity Conservation Act, 1999

A draft Priority Action Statement has been prepared that (1) sets out the recovery and threat abatement strategies to be adopted for each threatened Species, (2) establishes relative priorities to implement the above strategies, (3) establishes performance indicators to report achievements in implementing recovery and threat abatement strategies and their effectiveness, (4) contains a status report on each threatened species (where information is available) and (5) sets out clear timetables for recovery and threat abatement planning and achievement.

There is currently two final and one draft Threat Abatement Plans in NSW for:

- Predation by the Red Fox, *Vulpes vulpes*
- Predation by Plague Minnow
- Bitou bush (draft)

At the time of writing there are four final Recovery Plans that relate to species in the Hornsby area for:

- *Persoonia mollis* ssp. *maxima*
- Yellow Bellied Glider
- *Darwinia biflora*
- Bush Stone-Curlew

and six draft Recovery Plans, for:

- Barking Owl
- Green and Golden Bell Frog
- Southern Brown Bandicoot
- *Zieria involucrata*
- Koala
- Large Forest Owls

Also at the time of writing, there is no Critical Habitat Mapping that applies to the Hornsby Local Government Area.

Australian Recovery Plans

- Swift Parrot 2001-2005
- Regent Honeyeater 1999-2003
- Grey Nurse Shark (*Carcharias taurus*) in Australia

- Stream Frogs of South-east Queensland 2001-2005
- Southern Right Whale
- Humpback Whale Recovery Plan 2005 – 2010

Australian Threat Abatement Plans

- Predation by Feral Cats
- Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs
- Infection of amphibians with chytrid fungus resulting in chytridiomycosis
- Albatrosses and Giant-Petrels 2001-2005

Appendix 10: Known or Potential Habitat for Threatened Fauna Species and Endangered Populations in the Hornsby Shire

Refer to Council's Hornsby Shire Threatened Biota Conservation Plan for more information .

K= known to be important; P= potentially important; *= highly important; **= extremely important

Habitat Features	Green & Golden Bell Frog	Broad-headed Snake	Bush Stone Curlew	Swift Parrot	Regent Honeyeater	Southern Brown Bandicoot	Gang-gang Cockatoo	Giant Burrowing Frog	Red-crowned Toadlet	Heath Monitor	Glossy Black-Cockatoo	Sooty Oystercatcher	Black Bittern	Turquoise Parrot	Barking Owl	Powerful Owl	Osprey	Grass Owl	Blue-billed Duck	Rose-crowned Fruit Dove	Superb Fruit-dove	Freckled Duck	Sooty Owl	Masked Owl	Grass Owl	Eastern Pygmy-Possum	Spotted-tailed Quoll	Great Pipistrelle	Common Bent-wing Bat	Eastern Little Mastiff Bat	Large-footed Myotis	Yellow-bellied Glider	Koala	Squirrel Glider	Grey-headed Flying Fox	Yellow-bellied Sheathtail Bat	Greater Broad-nosed Bat	Adams Emerald Dragonfly
Acacia irrorata (food plant)																																		K				
Acacia longifolia (food plant)																																		K				
Allocasuarina distyla (food plant)											K																											
Allocasuarina littoralis (food plant)											K																											
Allocasuarina torulosa (food plant)											K																											

Habitat Features	Green & Golden Bell Frog	Broad-headed Snake	Bush Stone Curlew	Swift Parrot	Regent Honeyeater	Southern Brown Bandicoot	Gang-gang Cockatoo	Giant Burrowing Frog	Red-crowned Toadlet	Heath Monitor	Glossy Black-Cockatoo	Sooty Oystercatcher	Black Bittern	Turquoise Parrot	Barking Owl	Powerful Owl	Osprey	Grass Owl	Blue-billed Duck	Rose-crowned Fruit Dove	Superb Fruit-dove	Freckled Duck	Sooty Owl	Masked Owl	Grass Owl	Eastern Pygmy-Possum	Spotted-tailed Quoll	Great Pipistrelle	Common Bent-wing Bat	Eastern Little Mastiff Bat	Large-footed Myotis	Yellow-bellied Glider	Koala	Squirrel Glider	Grey-headed Flying Fox	Yellow-bellied Sheathtail Bat	Greater Broad-nosed Bat	Adams Emerald Dragonfly
Angophora costata (food plant)																																	P	P				
Banksia ericifolia (food plant)					P																													P				
Banksia integrifolia (food plant)					P																													K				
Banksia serrata (food plant)																																		K				
Banksia spinulosa (food plant)																																		K				
C gummifera (food plant)																																	P	K				
Ebotryoides (food plant)																																	P	P				
Eucalyptus globiodea (food plant)																																	P					
Eucalyptus haemastoma (food plant)																																	K *					

Habitat Features	Green & Golden Bell Frog	Broad-headed Snake	Bush Stone Curlew	Swift Parrot	Regent Honeyeater	Southern Brown Bandicoot	Gang-gang Cockatoo	Giant Burrowing Frog	Red-crowned Toadlet	Heath Monitor	Glossy Black-Cockatoo	Sooty Oystercatcher	Black Bittern	Turquoise Parrot	Barking Owl	Powerful Owl	Osprey	Grass Owl	Blue-billed Duck	Rose-crowned Fruit Dove	Superb Fruit-dove	Freckled Duck	Sooty Owl	Masked Owl	Grass Owl	Eastern Pygmy-Possum	Spotted-tailed Quoll	Great Pipistrelle	Common Bent-wing Bat	Eastern Little Mastiff Bat	Large-footed Myotis	Yellow-bellied Glider	Koala	Squirrel Glider	Grey-headed Flying Fox	Yellow-bellied Sheathtail Bat	Greater Broad-nosed Bat	Adams Emerald Dragonfly
E paniculata (food plant)																																P	P				
E piperita (food plant)																																P					
E punctata (food plant)																																K**	P				
E racemosa (food plant)																																P					
E robusta (food plant)				K*	K*																										P	K*	K				
E saligna (food plant)				P		K																															
E tereticornis (food plant)																																K*					
E umbra (food plant)																																P					
Melaleuca quinquenervia (food plant)																																	K				
Mistletoes (food plants)					K																												K				
Xanthorrhoea spp. (food plants)																																	K				

Habitat Features	Green & Golden Bell Frog	Broad-headed Snake	Bush Stone Curlew	Swift Parrot	Regent Honeyeater	Southern Brown Bandicoot	Gang-gang Cockatoo	Giant Burrowing Frog	Red-crowned Toadlet	Heath Monitor	Glossy Black-Cockatoo	Sooty Oystercatcher	Black Bittern	Turquoise Parrot	Barking Owl	Powerful Owl	Osprey	Grass Owl	Blue-billed Duck	Rose-crowned Fruit Dove	Superb Fruit-dove	Freckled Duck	Sooty Owl	Masked Owl	Grass Owl	Eastern Pygmy-Possum	Spotted-tailed Quoll	Great Pipistrelle	Common Bent-wing Bat	Eastern Little Mastiff Bat	Large-footed Myotis	Yellow-bellied Glider	Koala	Squirrel Glider	Grey-headed Flying Fox	Yellow-bellied Sheathtail Bat	Greater Broad-nosed Bat	Adams Emerald Dragonfly
Dark caves (roost sites)																							K					P	K		K							
Dead trees with hollows (nest or shelter sites)											K																	K		K				K		K	K	
Densely foliaged trees near water (nest and roost sites)													K																									
Grassland, seasonally dry wetlands, grassy swamp oak areas																									K													
High density of small & medium sized mammals (prey species)																K											K											

Habitat Features	Green & Golden Bell Frog	Broad-headed Snake	Bush Stone Curlew	Swift Parrot	Regent Honeyeater	Southern Brown Bandicoot	Gang-gang Cockatoo	Giant Burrowing Frog	Red-crowned Toadlet	Heath Monitor	Glossy Black-Cockatoo	Sooty Oystercatcher	Black Bittern	Turquoise Parrot	Barking Owl	Powerful Owl	Osprey	Grass Owl	Blue-billed Duck	Rose-crowned Fruit Dove	Superb Fruit-dove	Freckled Duck	Sooty Owl	Masked Owl	Grass Owl	Eastern Pygmy-Possum	Spotted-tailed Quoll	Great Pipistrelle	Common Bent-wing Bat	Eastern Little Mastiff Bat	Large-footed Myotis	Yellow-bellied Glider	Koala	Squirrel Glider	Grey-headed Flying Fox	Yellow-bellied Sheathtail Bat	Greater Broad-nosed Bat	Adams Emerald Dragonfly
Hawkesbury sandstone heath vegetation						K																																
Large farm dams																			K			K																
Large stick nests in dead or live trees near water																	K																					
Live trees with hollows (nesting or shelter sites)											K				K	K								K				K		K				K		K	K	
Minor creeks on or near Hawkesbury Sandstone								K	K																													
Open woodlands			K																																			
Rainforest																				K	K																	
Rocky heath										K																												
Saltmarsh & mangroves			K																	K					K													

Habitat Features	Green & Golden Bell Frog	Broad-headed Snake	Bush Stone Curlew	Swift Parrot	Regent Honeyeater	Southern Brown Bandicoot	Gang-gang Cockatoo	Giant Burrowing Frog	Red-crowned Toadlet	Heath Monitor	Glossy Black-Cockatoo	Sooty Oystercatcher	Black Bittern	Turquoise Parrot	Barking Owl	Powerful Owl	Osprey	Grass Owl	Blue-billed Duck	Rose-crowned Fruit Dove	Superb Fruit-dove	Freckled Duck	Sooty Owl	Masked Owl	Grass Owl	Eastern Pygmy-Possum	Spotted-tailed Quoll	Great Pipistrelle	Common Bent-wing Bat	Eastern Little Mastiff Bat	Large-footed Myotis	Yellow-bellied Glider	Koala	Squirrel Glider	Grey-headed Flying Fox	Yellow-bellied Sheathtail Bat	Greater Broad-nosed Bat	Adams Emerald Dragonfly
Still or slow flowing water free of predatory fish	K																																				
Tall mature eucalypt forests																															K						
Terrestrial termite mounds (nesting sites)										K																											
Unshaded rocks on bare rock surface		K																																			
Woodland and forest near open country, permanent water favoured														K																							

Appendix 11: Native Vegetation Communities in the Hornsby Shire

Vegetation Map Unit, Lembit, 2001 and Final Determinations of the Scientific Committee	**Benson & Howell Map Unit, Sydney 1:100,000 1994**	**Geology**	**Hornsby Vegetation Community Smith & Smith, 2006, main species**	**Conservation Significance**
Endangered Ecological Community listed by the NSW Scientific Committee under the Threatened Species Conservation Act, 1995				
Blue Gum High Forest **#	6b	Wianamatta Group	Community BG Blue Gum High Forest *Eucalyptus saligna, E. pilularis, E. paniculata, Angophora costata, Syncarpia glomulifera* TOF	National, State
Sydney Turpentine-Ironbark Forest**	9o	Wianamatta Group, Mittagong Formation and shale lenses in Hawkesbury Sandstone	Community TI Turpentine Ironbark Forest Variable - *S. glomulifera, A. costata, Corymbia gummifera, E. resinifera, E. pilularis, E. paniculata, E. punctata, E. globoidea, E. acmenoides* OF	National, State
Shale / Sandstone Transition Forest*		Hawkesbury Sandstone with shale influence	Community SS Shale/Sandstone Transition Forest *E. punctata, E. eugenioides, C. gummifera, A. costata* OF	National, State
Duffys Forest Ecological Community	9sf	Hawkesbury Sandstone with shale lenses or near Wianamatta Group	Community DF Duffys Forest Variable - *C. gummifera, A. costata, S. glomulifera, E piperita, E. pilularis, E. sparsifolia, E. punctata, E. globoidea, E. acmenoides* OF	State
River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	9f	Quaternary alluvium	Community RF River-flat Forest *E. saligna, E. pilularis, A. floribunda* TOF	State

Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	27a(i)	Quaternary alluvium	Community SF1 Swamp Mahogany Forest *E. robusta, Melaleuca quinquenervia* OF	State
Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	27a(iii)	Quaternary alluvium	Community SF2 Floodplain Paperbark Scrub *Melaleuca ericifolia* CS	State
Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	27a(iv)	Quaternary alluvium	Community SF3 Floodplain Reedland *Phragmites australis* CG	State
Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions	4a(ii)/(iii)	Quaternary alluvium	Community CS Coastal Saltmarsh *Juncus kraussii* CR	State
Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions	4a(iv)	Quaternary alluvium	Community SO *Casuarina glauca* CF	State
Other communities				
Sydney Sandstone Gully Forest	10ag(i)	Hawkesbury Sandstone	Community A Peppermint Angophora Forest *Eucalyptus piperita, Angophora costata* OF	Common
Sydney Sandstone Gully Forest	10ag(i)	Hawkesbury Sandstone	Community B Narrow-leaved Apple Gully Forest *E. piperita, A. bakeri* OF	Regional
Sydney Sandstone Ridgetop Woodland	10ar(i)	Hawkesbury Sandstone	Community C Bloodwood- Scribbly Gum Woodland *C. gummifera, E. haemastoma* W	Common
Sydney Sandstone Ridgetop Woodland	10ar(ii)	Hawkesbury Sandstone	Community D Grey Gum Scribbly Gum Woodland *C. gummifera, E. punctata, E.haemastoma, A. costata* W or OF	Common
Sydney Sandstone Ridgetop Woodland	10ar(i)	Hawkesbury Sandstone	Community E Silvertop Ash- Scribbly Gum Woodland *E. seiberi, E. haemastoma - C. gummifera, A. costata* W or OF	Local
Sydney Sandstone Ridgetop Woodland	10ar(i)	Hawkesbury Sandstone	Community F Narrow-leaved Scribbly Gum Woodland *E. racemosa, C. gummifera* W or OF	Common

Sydney Sandstone Ridgetop Woodland	10ar(i, iii)	Hawkesbury Sandstone	Community G1 Scribbly Gum Open-woodland / heath *E. haemastoma (or E. racemosa), C. gummifera, Angophora hispida, Banksia ericifolia, Leptospermum trinervium* OW, LOW, CH or CS	Common
Coastal Sandstone Heath	21g(iv)	Hawkesbury Sandstone	Community H Rock Platform Heath Variable - *Acacia suaveolens, Angophora hispida, Baeckia brevifolia, B. diosmifolia, B. ericifolia, Dillwynia floribunda, Epacris microphylla, Kunzea ambigua, Leptospermum squarrosum, L. trinervium etc.* OH or CH	Regional
Coastal Sandstone Heath	21g(vi)	Hawkesbury Sandstone	Community I Sandstone Swamp Variable- *Baeckia imbricata, Banksia ericifolia, B. oblongifolia, Callistemon citrinus, Hakea teretifolia, Lepidosperma filiforme, Leptospermum squarrosum, Schoenus brevifolius, Viminaria juncea, Xanthorrhoea resinifera*	Regional
Glen Forest#	6c(i)	Jurassic Volcanic	Community J Blue Gum Diatreme Forest *E. saligna* TOF	Regional
Sydney Sandstone Gully Forest	10ag(ii)	Hawkesbury Sandstone with shale lenses or near Wianamatta Group	Community L Blackbutt Gully Forest *E. pilularis, A. costata, S. glomulifera* TOF	Local
Glen Forest	6c(ii)	Jurassic Volcanic	Community N Blue-leaved Stringybark Ironbark Forest *A. costata, E. agglomerata, Allocasuarina torulosa* OF	Regional
Sydney Sandstone Gully Forest	10ag(iii)	Hawkesbury Sandstone	Community O1 Coachwood Rainforest *Ceratopetalum apetalum, Callicoma serratifolia, Pittosporum undulatum, Tristania laurina* LCF or CF	Regional
Sydney Sandstone Gully Forest	10ag(iii)	Narrabeen Group	Community O2 Grey Myrtle Rainforest *Backhousia myrtifolia* LCF or CF	Regional

Narrabeen Slopes Forest	9h(ii)	Narrabeen Group and Hawkesbury Sandstone	Community Q1 Rough-barked Apple Forest Oak Forest *Allocasuarina torulosa, Angophora floribunda, E. punctata, E. piperita* OF	Regional
Narrabeen Slopes Forest	9h(ii)	Narrabeen Group and Hawkesbury Sandstone	Community Q2 Blackbutt-Rough-barked Apple Slopes Forest *E. pilularis, All. torulosa, A. floribunda, A. costata, C. gummifera* OF	Regional
Narrabeen Slopes Forest	9h(ii)	Narrabeen Group	Community R Narrow-leaved Apple Slopes Forest *A. bakeri, All. torulosa, E. tereticornis, E. punctata, E. eugenioides, C. eximia* OF	Regional
Sydney Sandstone Ridgetop Woodland	10ar(i)	Hawkesbury Sandstone and Narrabeen Group	Community S Angophora Woodland *A. costata, C. gummifera, E. umbra* W or OF	Local
Sydney Sandstone Ridgetop Woodland	10ar(ii)	Hawkesbury Sandstone	Community T Yellow Bloodwood Woodland *C. eximia* W or LW	Common
Estuarine Complex	4a(i)	Quaternary alluvium	Community W Mangrove Swamp *Avicennia marina, Aegiceris corniculatum* LCF or CS	Local

* Endangered Ecological Community under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999
** Critically Endangered Ecological Community under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999
# Preliminary Determination as a Critically Endangered Ecological Community under the Threatened Species Conservation Act 1995

Appendix 12: Detailed Threatened Species and Biodiversity Conservation Actions

Surveys and monitoring for threatened species

Survey and monitor for:

- *Acacia bynoeana* on ridgetops, fire & powerline trails in Communities G & H during September to March
- *Acacia gordonii* in previously known areas - Hornsby, Glenorie and Berrilee in Community H during August to September
- *Ancistrachne maidenii* in Community Q or other Narrabeen shale/ sandstone interfaces
- *Caladenia tessellata* in Sep to Nov after fire - Hawkesbury River & Berowra in clay loam or sandy soils
- *Darwinia peduncularis* in Communities A & H
- *Epacris purpurascens* var. *purpurascens* in Galston area etc
- *Eucalyptus* sp. Cattai near Mt Colah
- *Grevillea parviflora* ssp. *supplicans* in Fiddletown, Maroota, Berrilee, Arcadia and Glenorie in Communities C, D, F, G, H, M and Shale/Sandstone Transition Forest
- *Haloragis exalata* ssp. *exalata* in Communities W, V or Q
- *Micromyrtus blakelyi* on fire trails where they pass through rock platforms and Communities G & H
- *Olearia cordata* north and east of Maroota and near Wisemans Ferry Historic Site
- *Persoonia hirsuta* along fire trails and powerline tracks especially near Cowan, Galston and Marramarra National Park
- *Pimelia curviflora* var. *curviflora* around old records near Cowan and rural areas
- *Archaeophya adamsi* Adams Emerald Dragonfly monitoring in Tunks Creek and searches in Joe Crafts Creek and similar habitats
- *Darwinia fascicularis* ssp. *oligantha* in the Maroota area
- Heath Monitor during Spring-Summer in Community G and scrubbier examples of C-F.
- Koala habitat especially at Porto Bay and east of Wisemans Ferry to establish “core koala habitat” under SEPP 44 (Communities A, C-G, L, N &Q-U)
- Survey/ monitor likely and known habitat of Spotted-tailed Quoll especially at Old Mans Valley and collect scats to establish dietary information (Communities A, J-O & Q)
- Survey for Eastern Little Mastiff-bat in Berowra Valley Regional Park (Communities A-G & J-U)
- Winter survey for Large Bentwing Bat known and potential roost sites that are easily accessible or within areas zoned for development (Communities A-G & J-U)

- Survey for Greater Broad-nosed Bat (Communities A-G & J-U)
- Survey for Large-footed Myotis likely roosting locations
- Survey for Great Pipistrelle (Communities A-B, J-U)
- Survey for Southern Brown Bandicoot (Communities C-G)
- Survey of Hawkesbury River wetlands for Grass Owl
- Survey for Regent Honeyeater (Blue Gum High Forest and Swamp Mahogany Forest)
- Monitor Adams Emerald Dragonfly population at Tunks Creek and survey other potential habitat
- Survey Waitara Creek for Common Dunnart

Provide input to Bush Fire Risk Management Plan to mitigate impacts on threatened species

Ensure appropriate fire regime:

- 8-12 year fire interval, hot burns for *Acacia bynoeana*, *Acacia gordonii*
- 15-20 year fire interval, moderate to high fire intensity for *Asterolasia elegans*
- 10-15 year fire interval for *Callistemon linearifolius* especially at Porto Ridge, Brooklyn and Friendly Island
- 10-20 year fire interval for *Darwinia biflora*
- moderate to high fire intensity for *Leptospermum deanei* near urban areas
- 12-15 year fire interval for *Olearia cordata* and avoid February to May burns
- 12-15 year fire interval for *Persoonia mollis* subsp. *maxima*
- for Southern Brown Bandicoot if presence is confirmed

Protect habitats in hazard reductions:

- prevent burning of Giant Burrowing Frog habitat along ephemeral/ permanent creeklines in Communities A-I, L-T
- prevent burning/ rake to mineral earth known Koala feed trees (Communities A, C-G, L, N &Q-U), Yellow-bellied Sheathtail Bat roost trees(Communities A-G & J-U) and if located Greater Broad-nosed Bat roost trees (Communities A-G & J-U)

Protect from too frequent fire:

- Nest sites of Masked Owl (Communities A-G, J-N, P-U)
- Arboreal mammal density (prey species for Powerful Owl (Communities A-G, J-U)

Maintain habitat though improved water quality

- Maintain/ improve water quality to Powerful Owl roost areas along gullies to prevent weed invasion
- Improve water quality in Berowra Creek to assist Black Bittern and other riparian fauna (Cormorants, Whistling Kites, Sea-eagles, Osprey) with crayfish, fish and insects
- Strictly manage all water quality control ponds within the Tunks Creek catchment to protect Adams Emerald Dragonfly

Riparian restoration to protect threatened species

- *Asterolasia elegans* – control of crofton and riparian weeds
- *Epacris purpurascens* var. *purpurascens* – at Waitara Creek
- *Leptospermum deanei* –weed and stormwater control in tributaries of Lane Cove River, Calna Creek and Marramarra Creek

Bushland regeneration to protect threatened species and endangered ecological communities

- *Eucalyptus camfieldii* at Stewart Ave, Hornsby
- *Olearia cordata* if any specimens are found in weedy areas
- *Epacris purpurascens* var *purpurascens* near Normanhurst Oval in Waitara Creek Bushland Reserve
- *Persoonia mollis* ssp. *maxima* at Hunt Reserve Mt Colah and Galston Park
- Undertake bush regeneration in reserves where Blue Gum High Forest, Sydney Turpentine-Ironbark Forest, Shale/Sandstone Transition Forest and other Endangered Ecological Communities are affected by weed invasion
- Ensure no overclearing of bushland weeds in Waitara Creek to provide cover for Common Dunnart
- Direct priority for new contract bush regeneration projects to additional reserves where endangered ecological communities are present and encourage volunteer work in such reserves

Park Management

- Cease mowing in parks where there is an opportunity to rehabilitate Blue Gum High Forest, Sydney Turpentine-Ironbark Forest, Shale/Sandstone Transition Forest and other Endangered Ecological Communities, which are extremely endangered

- Curtail excessive recreational use in Blue Gum High Forest areas, Sydney Turpentine-Ironbark Forest, Shale/Sandstone Transition Forest and other Endangered Ecological Communities areas that could be rehabilitated
- Undertake a project to link Blue Gum High Forest and Sydney Turpentine-Ironbark Forest remnants using appropriate species to be planted in open space
- Protect Heath Monitor habitat on Crown land at Arcadia from further disturbance

Apply Noxious Weeds Act

- Control weeds on rural lands draining to *Zieria involucrata* habitats e.g. Marramarra National Park

Protect threatened species from damage on fire trails, walking tracks and roadside edges and high use areas.

Locate and protect from damage:

- *Acacia bynoeana* on fire trails
- *Ancistrachne maidenii* on walking tracks & road edges especially at Franks Bight and Crosslands
- *Asterolasia elegans* on edges of Laughtondale Gully Road, especially threats such as weed invasion, sedimentation, erosion, inappropriate fire, rubbish dumping and clearing
- *Darwinia peduncularis* – close, revegetate & relocate informal trails at Dead Horse Bay Brooklyn and protect from damage on powerline tracks at Berowra
- *Epacris purpurascens* var *purpurascens* near Normanhurst Oval and install protective barriers
- *Eucalyptus camfieldii* from track maintenance at fire trail in Quarry Road, Dural through liaison with energy utilities
- *Grevillea parviflora* ssp *supplicans* - close unnecessary trails in areas of known habitat and protect from fire trail maintenance, hazard reduction activities and other uses of trails, and
- *Kunzea rupestris*- inform RFS of locations to prevent repeat of damage done, close non-essential trails in known habitat
- *Lasiopetalum joyceae* – prevent losses during fire mitigation works and trail maintenance
- *Melaleuca deanei*- close unnecessary trails, prevent damage by recreational users, install barriers to prevent further damage by RFS and electricity utilities, especially on the fire trail north of Montview reservoir in Hornsby Heights and the fire trail on a ridge behind the retirement village at Galston
- *Olearia cordata* - prevent damage from roadside maintenance if any specimens are found, and signpost as Significant Roadside Environment

- *Persoonia hirsuta* – extreme care required when maintaining access and fire trails, prevent recreational access where known sites are at risk
- *Pimelia curviflora* var. *curviflora* on fire and utility trails
- *Tetratheca glandulosa* on fire and powerline trails; limit recreational use of trails in known habitat areas
- *Zieria involucrata* on the edges of Laughtondale Gully Road
- Known populations of *Darwinia fascicularis* ssp. *oligantha*
- Rationalise tracks in the upper Waitara Creek bushland area to reduce exposure of Common Dunnart to predators

Protect known habitats

- Protect Large Bentwing Bat roost site in stormwater pipe at Mt Kuring-gai industrial area
- Protect roost trees of Yellow-bellied Sheathtail Bat (Communities A-G & J-U)
- Identify and protect nest sites of Turquoise Parrot
- Identify and protect nesting and foraging areas of Glossy Black-cockatoo (Communities A, C-G, J-N, P-T)
- Identify and protect nesting and roosting sites of Masked Owl (Communities A-G, J-N, P-U)
- Identify and protect nesting and roosting sites of Sooty Owl (Communities D, J-P)
- Protect nest and roost sites of Powerful Owl (Communities A-G, J-U)
- If presence confirmed, protect habitat of Southern Brown Bandicoot
- If Bush Stone-curlew located, initiate habitat protection plan with NPWS
- If Grass Owl located, initiate protection of wetlands
- Conserve and restore Swift Parrot and Regent Honeyeater habitat (Blue Gum High Forest and Swamp Mahogany Forest) in streetscapes, parks and development areas
- Monitor records and habitat of Superb Fruit-dove and protect tall open forests and gallery forests

Educate and inform community about biodiversity

- Develop Education Plan for promotion of biodiversity in the community
- Inform residents about impacts of dogs (especially on koala colonies in the Berowra Waters area and possibly Brooklyn)
- Inform residents about threatened species

- Notify poultry farm owners about Spotted-tailed Quoll's conservation and legal status
- Encourage rural landowners to use raptor friendly rodenticides i.e. Racumin (Masked Owl)

Prevent losses of threatened species through DA process / planning schemes

As part of DA process, survey, conduct assessment of significance and / or SIS and if appropriate rezone land, for the following species in particular:

- *Acacia bynoeana*
- *Callistemon linearifolius* at Porto Ridge, Brooklyn
- *Darwinia biflora*, especially in the west and north of the Shire, and where small patches of plants form an important link between parts of a larger population
- All individuals of *Epacris purpurascens* var. *purpurascens* until conservation status better understood
- *Eucalyptus* sp. Cattai at lateritic sites where clearing is proposed
- *Lasiopetalum joyceae* at Berowra and Berowra Heights
- *Melaleuca deanei* – assessments to be undertaken of impacts that bushfire management measures would have on the species
- Conserve all individuals of *Persoonia hirsuta* due to extreme rarity
- Survey and consider impacts of development on upper slope and ridgetop occurrences of *Persoonia mollis* subsp. *maxima* especially at Binya Close.
- Particular weight be given to large populations of *Tetratheca glandulosa* and those in the south of the Shire when assessing DAs
- Prevent further substantial losses of Blue Gum High Forest through the DA process and introduction of a target of no net loss
- Introduce a target of no net loss of Blue Gum High Forest
- Map Blue Gum High Forest on private land
- Locate On Site Wastewater Disposal systems to avoid overflows reaching ephemeral / permanent creeks (Red-crowned toadlet and Giant Burrowing Frog habitat, Fishing Bat predation areas and Powerful Owl roost sites)

Appendix 13: Endangered Ecological Communities on Public Land in Hornsby

Reserve	Suburb	Endangered Ecological Community	Size	Rank
Carrs Bush	Galston	STIF	6.07ha	1
McKinley Place Bushland	Cherrybrook	STIF	4.5ha	2
Brittania Street Bushland/ Nursery	Pennant Hills	STIF	4.3ha	3
Fagan Park	Galston	STIF	4ha	4
Reddy Park	Hornsby	STIF	3.1ha	5
New Farm Rd Bushland (Walumeda)	WPennant Hills	BGHF	2.82ha	1
Lakes of Cherrybrook	Cherrybrook	BGHF	2ha	2
Fearnley Park	Beecroft	BGHF	1.94ha	3
Kenley Park	Normanhurst	BGHF	1.9ha	4
Glenorie Park	Glenorie	STIF	1.9ha	6
Observatory Park	Pennant Hills	BGHF	1.77ha	5
Beecroft Village Green	Beecroft	STIF	1.71ha	7
Upper Pyes Creek	Castle Hill	BGHF	1.5ha	6
Kanangra Cres Bushland (Appletree)	Cherrybrook	STIF	1.4ha	8
Upper Pyes Creek/ Erlestoke Park	Castle Hill	BGHF	1.36ha	7
Campbell Park	WPennant Hills	BGHF	1.33ha	8
Vimiera Park	Epping	BGHF	1.3ha	9
Tekopa Road Bushland	Glenorie	STIF	1.25ha	9
Netherby Street Reserve	Wahroonga	BGHF	1.03ha	10
Greenway Park	Cherrybrook	STIF	1.0ha	10
Arcadia Park	Arcadia	STIF	0.95ha	11
Oakleigh Park	Thornleigh	STIF	0.86ha	12
Dawson Avenue Park	Thornleigh	STIF	0.8ha	13
Normanhurst Park	Normanhurst	STIF	0.79ha	14
Edwards & Lamorna Ave Bushland	Beecroft	BGHF	0.61ha	11
Cairnes Road Playground	Glenorie	STIF	0.47ha	15
Kent Street Reserve	Epping	BGHF	0.6ha	12
Pogson Drive	Cherrybrook	STIF	0.36ha	16
Pacific Highway	Berowra	SSTF	0.32ha	1
Samuel Oxley Park	WPennant Hills	BGHF	0.29ha	13
Pyes Creek Bushland	Dural	STIF	0.25ha	17
Briddon Road Playground (Laurence)	Pennant Hills	STIF	0.24ha	18
Tim Brownscombe Reserve	Galston	STIF	0.24ha	19
Ray Park	Carlingford	BGHF	0.2ha	14
Tim Brownscombe Reserve	Galston	BGHF	0.19ha	15
Rd Reserve near Lilian Fraser Garden	Pennant Hills	BGHF	0.17ha	16
Asquith Park	Asquith	STIF	0.16	20
Berowra Valley Regional Park	Pennant Hills	SSTF	0.15ha	2
Kelly Park	WPennant Hills	BGHF	0.12ha	17
Hastings Park	Castle Hill	STIF	0.06ha	21

Appendix 14: Listed Noxious Weeds for the Hornsby Shire

Common Name	Scientific Name	Class	Area
African feathergrass	*Pennisetum macrourum*	5	NSW
African turnipweed	*Sisymbrium runcinatum*	5	NSW
African turnipweed	*Sisymbrium thellungii*	5	NSW
Alligator weed	*Alternanthera philoxeroides*	5	Hornsby
Anchored water hyacinth	*Eichhornia azurea*	1	NSW
Annual ragweed	*Ambrosia artemisiifolia*	5	NSW
Arrowhead	*Sagittaria montevidensis*	5	NSW
Artichoke thistle	*Cynara cardunculus*	5	NSW
Asparagus fern	*Asparagus densiflorus*	4	Hornsby
Athel tree	*Tamarix aphylla*	5	NSW
Balloon vine	*Cardiospermum grandiflorum*	4	Hornsby
Bitou bush and Boneseed	*Chrysanthemoides monilifera* subsp. *rotunda* and subsp. *monilifera*	3	Hornsby
Black knapweed	*Centaura nigra*	1	NSW
Blackberry	*Rubus fruticosus* (agg.spp.)	4	NSW
Black Knapweed	*Centaurea nigra*	1	NSW
Bridal creeper	*Myrsiphyllum asparagoides*	4	Hornsby
Broomrapes	All *Orobanche* species except the native *O. cernua* var. *australiana* and *O. minor*	1	NSW
Burr ragweed	*Ambrosia confertiflora*	5	NSW
Cabomba	*Cabomba caroliniana*	5	NSW
Camphor laurel	*Cinnamomum camphora*	4	Hornsby
Cape broom	*Genista monspessulana*	3	Hornsby
Cape ivy	*Delairea odorata*	4	Hornsby
Castor oil plant	*Ricinus communis*	4	Hornsby
Cat's claw creeper	*Macfadyena unguis-cati*	4	Hornsby
Cayenne snakeweed	*Stachytarpheta cayennensis*	5	NSW
Chilean needle grass	*Nassella neesiana*	4	Hornsby
Chinese violet	*Aysystasia gangetica* subsp. *micrantha*	1	NSW
Climbing asparagus	*Asparagus plumosus*	4	Hornsby
Clockweed	*Gaura lindheimeri* and *G. parviflora*	5	NSW
Corn sowthistle	*Sonchus arvensis*	5	NSW
Dodder	All *Cuscuta* species except the native *C. australis, C. tasmanica* and *C. victoriana*	5	NSW
East Indian hygrophila	*Hygrophila polysperma*	1	NSW
Elephant grass/ Giant Reed	*Arundo donax*	4	Hornsby
English broom/ Scotch broom	*Cytisus scoparius*	4	Hornsby
Espartillo	*Achnatherum brachychaetum*	5	NSW
Eurasian water milfoil	*Myriophyllum spicatum*	1	NSW
Fine-bristled burr grass	*Cenchrus brownii*	5	NSW
Fountain grass	*Pennisetum setaseum*	5	NSW
Gallon's curse	*Cenchrus biflorus*	5	NSW

Glaucous starthistle	*Carthamus glaucus*	5	NSW
Golden thistle	*Scolymus hispanicus*	5	NSW
Green cestrum	*Cestrum parqui*	3	Hornsby
Harrisia cactus	*Harrisia* spp	4	NSW
Hawkweeds	*Hieracium* spp	1	NSW
Horsetail	*Equisetum* spp.	1	NSW
Hygrophila	*Hygrophila costata*	2	Hornsby
Hymenachne	*Hymenachne amplexicaulis*	1	NSW
Karoo thorn	*Acacia karoo*	1	NSW
Kochia	*Bassia scoparia*	1	NSW
Lagarosiphon	*Lagarosiphon major*	1	NSW
Lantana	*Lantana camara*	4	Hornsby
Long-leaf willow primrose	*Ludwigia longifolia*	4	Hornsby
Ludwigia/Water Primrose	*Ludwigia peruviana*	3	Hornsby
Madeira vine	*Anredera cordifolia*	4	Hornsby
Mexican feather grass	*Nassella tenuissima*	1	NSW
Mexican poppy	*Argemone mexicana*	5	NSW
Miconia spp	*Miconia*	1	NSW
Mimosa	*Mimosa pigra*	1	NSW
Morning glory (coastal)	*Ipomea cairica*	4	Hornsby
Morning glory (purple)	*Ipomea indica*	4	Hornsby
Mossman River grass	*Cenchrus echinatus*	5	NSW
Ochna	*Ochna serrulata*	4	Hornsby
Onion grass	All *Romulea* species and varieties except *R. rosea* var. *australis*	5	NSW
Oxalis	All *Oxalis* species and varieties except the native species *O. chnoodes*, *O. exilis*, *O. perennans*, *O. radicosa*, *O. rubens* and *O. thompsoniae*	5	NSW
Pampas grass	*Cortaderia* spp	4	Hornsby
Parthenium weed	*Parthenium hysterophorus*	1	NSW
Pellitory	*Parietaria judaica*	4	Hornsby
Pond apple	*Annona glabra*	1	NSW
Prickly acacia	*Acacia nilotica*	1	NSW
Prickly pears	*Cylindrppuntia* spp. and *Opuntia* spp. except *O. ficus indica*	4	NSW
Privet - broadleaf	*Ligustrum lucidum*	4	Hornsby
Privet - narrowleaf	*Ligustrum sinense*	4	Hornsby
Red rice	*Oyza rufipogon*	5	NSW
Rhizomatous bamboo	*Phyllostachys* spp.	4	Hornsby
Rhus tree	*Toxicodendron succedaneum*	4	NSW
Rubbervine	*Cryptostegia grandiflora*	1	NSW
Sagittaria	*Sagittaria platyphylla*	5	NSW
Salvinia	*Salvinia molesta*	2	Hornsby
Senegal tea plant	*Gymnocoronis spilanthoides*	1	NSW
Serrated tussock	*Nassella trichotoma*	4	Hornsby

Siam weed	*Chromolaena odorata*	1	NSW
Smooth-stemmed turnip	*Brassica barrelieri* subsp. *oxyrrhina*	5	NSW
Soldier Thistle	*Picnomon acarna*	5	NSW
Spotted Knapweed	*Centaurea maculosa*	1	NSW
St John's Wort	*Hypericum perforatum*	4	Hornsby
Texas blueweed	*Helianthus ciliaris*	5	NSW
Trad	*Tradescantia fluminensis*	4	Hornsby
Turkey rhubarb	*Acetosa sagittata*	4	Hornsby
Water caltrop	*Trapa* spp.	1	NSW
Water hyacinth	*Eichhornia crassipes*	2	Hornsby
Water lettuce	*Pistia stratiotes*	1	NSW
Water soldier	*Stratiotes*	1	NSW
Willows	All *Salix* species other than *S.babylonica, S. x calodendron, S. x reichardtii*	5	NSW
Witchweed	All *Striga* species except native species and *S. parviflora*	1	NSW
Yellow burrhead	*Limnocharis flava*	1	NSW
Yellow nutgrass	*Cyperus esculentus*	5	NSW

Class 1 - State Prohibited Weeds: The plant must be eradicated from the land and the land must be kept free of the plant.

Class 2 - Regionally Prohibited Weeds: The plant must be eradicated from the land and the land must be kept free of the plant.

Class 3 - Regionally Controlled Weeds: The plant must be fully and continuously suppressed and destroyed.

Class 4 - Locally Controlled Weeds: The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.

Class 5 - Restricted Plants: The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with.

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