BIODIVERSITY STRATEGY 2011-2020

Blacktown Local Government Area

Prepared for **Blacktown City Council**

January 2011

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Abbreviations

ABBREVIATION	DESCRIPTION
AKP	Australian Kyoto Protocol
BCC	Blacktown City Council
CAMBA	China-Australia Migratory Bird Agreement
CCM	Care, control or management
CCP	Cities for Climate Protection
CMA	Catchment Management Authority
CPRP	Cumberland Plain Recovery Plan
CPRS	Carbon Pollution Reduction Scheme
CEEC	Critically Endangered Ecological Community
CSA	Conservation Significance Assessment
DECCW	Department of Environment, Climate Change and Water
EEC	Endangered Ecological Community
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth)
ESF	Environmental Sustainability Framework
ESL	Environmentally Sensitive Lands
GGAS	Greenhouse Gas Abatement Scheme
Ha	Hectares
HNCMA	Hawkesbury Nepean Catchment Management Authority
HRCC	Hawkesbury River County Council
JAMBA	Japan-Australia Migratory Bird Agreement
LA21	Local Agenda 21
LEP	Local Environmental Plan
LGA	Local Government Area
MER	Monitoring, evaluation and reporting
NPWS	National Parks and Wildlife Service
NWGC	North West Growth Centre
PAS	Priority Action Statement
PCLs	Priority Conservation Lands
PoM	Plan of Management
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
SEPP	State Environmental Planning Policy
SMCMA	Sydney Metropolitan Catchment Management Authority
TCM	Total Catchment Management
TSC Act	*Threatened Species Conservation Act 1995* (NSW)
VCS	Voluntary Carbon Standard
WSP	Western Sydney Parklands

Executive Summary

This Biodiversity Strategy has been prepared for Blacktown City Council. It covers the Blacktown Local Government Area (LGA) in western Sydney, which includes a large portion of the North West Growth Centre and the Western Sydney Parklands. The Strategy was prepared in consultation with representatives from Blacktown City Council and NSW State Government agencies.

The vision for the Strategy is:

> *To conserve, restore and enhance biological diversity and ecosystem health, particularly threatened species, populations and communities, in the Blacktown Local Government Area.*

Implementation of the Strategy aims to:

- Conserve, restore and enhance remnant endangered ecological communities and the flora and fauna which they support within the LGA
- Recognise and respect the strong link between western Sydney's Aboriginal community and biodiversity
- Provide strategies for the effective long-term management and viability of remnant vegetation and ecosystems, including edge expansion and improved connectivity
- Inform appropriate planning controls to assist in achieving the vision and objectives of the Strategy
- Ameliorate threats to biodiversity
- Establish Blacktown City Council as a leader in establishing biodiverse-based carbon forests
- Ensure adequate communication within Council and with stakeholders, including the community, regarding the conservation and management of bushland remnants and biodiversity
- Provide appropriate management structures and resources to support the Strategy

Strategic biodiversity targets have been drawn from the NSW Biodiversity Strategy and Catchment Action Plans for the Hawkesbury Nepean and Sydney Metropolitan Catchment Management Authorities. Strategic targets for the Blacktown LGA have been identified for three broad areas:

- Western Sydney Parklands
- North West Growth Centre
- Remainder of the LGA (that is, all areas within the LGA other than Western Sydney Parklands and the North West Growth Centre)

Actions have been developed for the following categories and have responsibilities and priorities assigned:

- Planning, policy and guidelines
- Management and resources
- Communication and education
- On-ground works
- Monitoring

The Strategy will apply from 2010 to 2020. Priorities for implementation are consistent with the *Integrated Local Government Planning and Reporting Framework* as follows:

- High - to be completed by June 2013
- Medium - to be completed by June 2017
- Low - to be completed by June 2021

Key actions identified in this Strategy include:

- Establishment of a database of reports and data relating to Blacktown's biodiversity and a decision support tool to refine the identification of sites suitable for biosequestration
- Identification, protection and enhancement of biodiversity corridors and high conservation value areas
- Identification and facilitation of carbon sequestration opportunities
- Updating environmental planning instruments (Local Environmental Plan and Development Control Plans), overlays, and supporting documentation and training
- Development, prioritisation and implementation of plans of management for parks and reserves, targeting weeds, bushfire, feral animals, planting and regeneration, particularly within the ecological corridors

Funding for these actions is expected to come primarily from grants, Council's Environmental Stormwater Management Program, Council's Waste and Sustainability Improvement Program, and through offsetting loss of biodiversity in the North West Growth Centre.

Part 1
The Vision

1 Introduction

1.1 THE ROLE OF THE STRATEGY

The natural ecosystems of the Blacktown Local Government Area (LGA) have been extensively modified since European settlement. The extent of native vegetation cover and the numbers of native fauna across the LGA have been significantly reduced. Biodiversity continues to be threatened by urban development, land clearance, weed invasion, feral animals, and degraded water quality and flow regimes.

Section 8(1) of the *Local Government Act 1993* (NSW) requires 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 ecologically sustainable development.*

This Biodiversity Strategy offers Blacktown City Council and others an opportunity to improve the management of biodiversity within the Blacktown LGA in accordance with statutory obligations and current best practice. The Strategy has been developed using information available at the time of writing and it:

- Provides a strategic framework for the integrated and targeted implementation of biodiversity related projects within the LGA
- Indicates links between the Strategy and existing environmental programs and initiatives, such as the innovative biodiversity based carbon sequestration 'Regenesis' project
- Nominates strategic and practical actions with priorities and responsibilities

The role of the Strategy is to provide a broad, strategic platform for biodiversity management within the LGA. The Strategy will give direction to the subsequent development of operational level plans, policies, site assessments and on-ground works programs. **Figure 1** illustrates how this Strategy relates to higher order strategies, and more detailed plans and investigations.

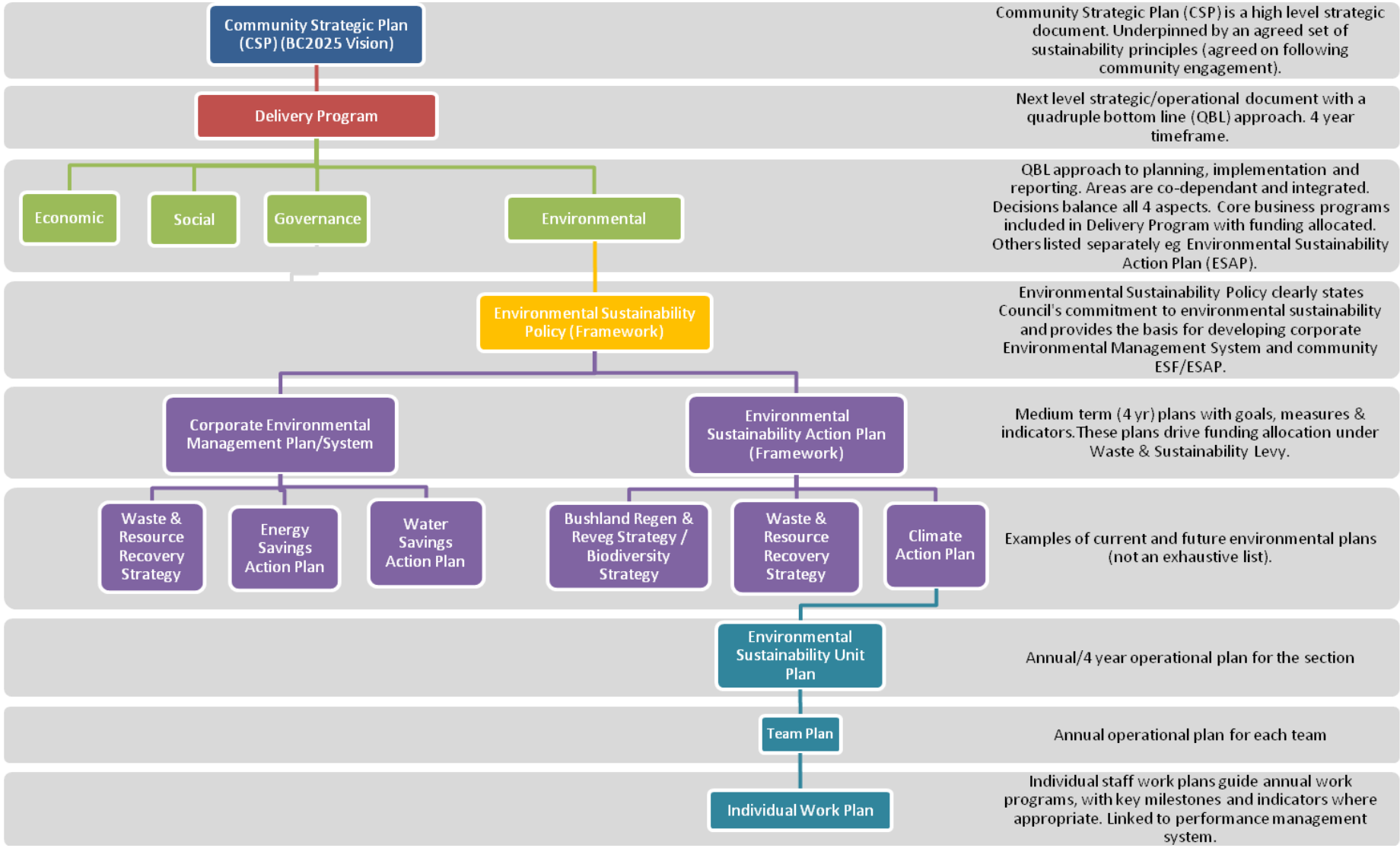


Figure 1: Management context for the Biodiversity Strategy (BCC)

1.2 STUDY AREA

The study area for the Biodiversity Strategy is defined by the boundary of the Blacktown LGA, as shown in **Figure 2**. A description of the characteristics of the study area is provided in **Part 2** of this Strategy.

1.3 WHAT IS BIODIVERSITY?

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

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

This is the definition adopted for this Strategy.

The concept of biodiversity emphasises the interconnectedness and interdependence of all life on earth and can be considered at three levels which are outlined below:

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

Biodiversity is valuable for a number of reasons. It provides for the critical processes that make life on earth possible, such as maintaining clean air and water, the formation of soil, and the pollination of plants that produce oxygen. Biodiversity is also responsible for food, as well as many medicines and industrial products. It provides opportunities for recreation, tourism, scientific research and education. Biodiversity is also considered a source of cultural identity for many Australians. It has been recognised that areas of high biodiversity are more easily able to withstand significant environmental changes and disturbances than areas of lower diversity.

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

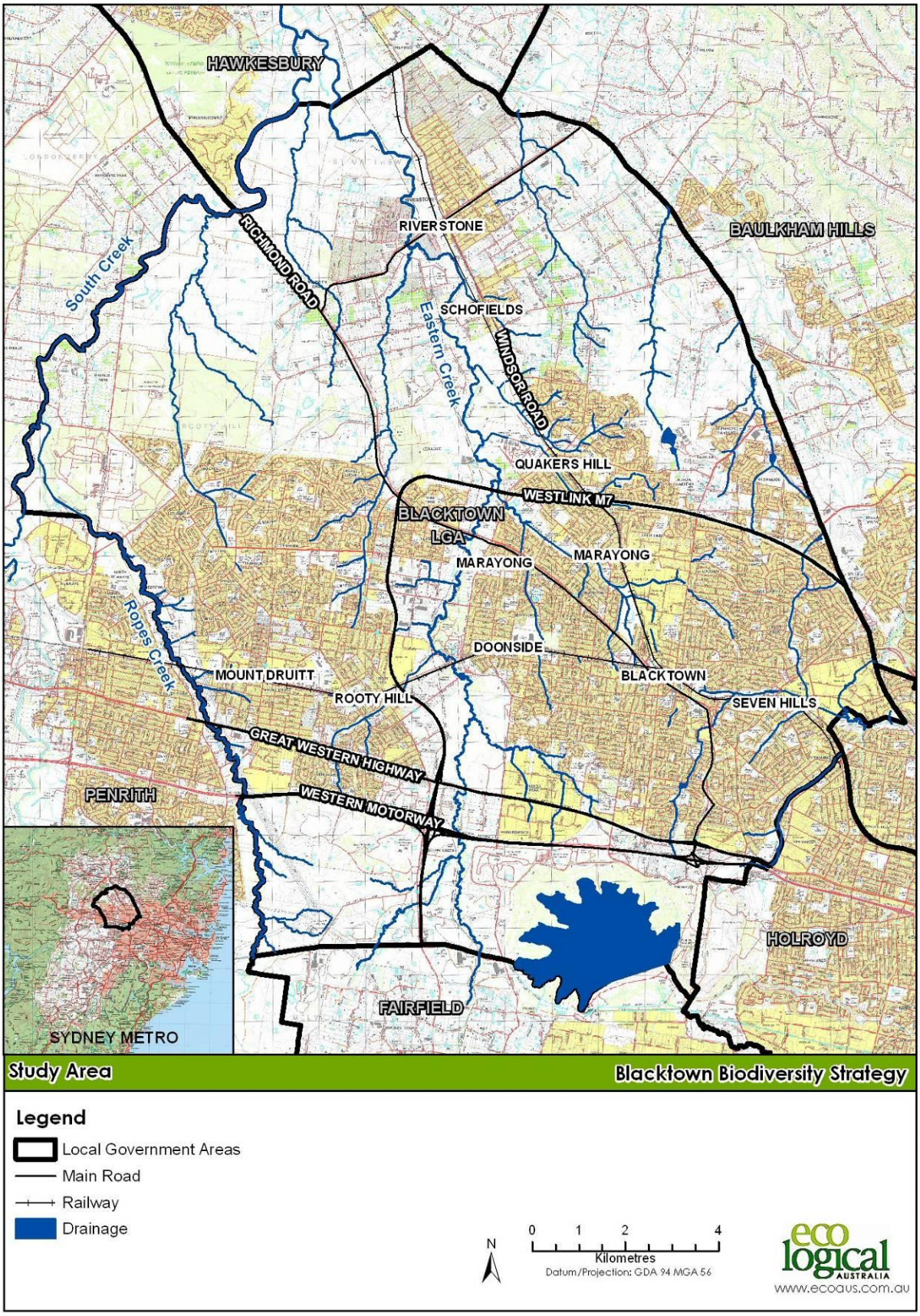


Figure 2: Study Area

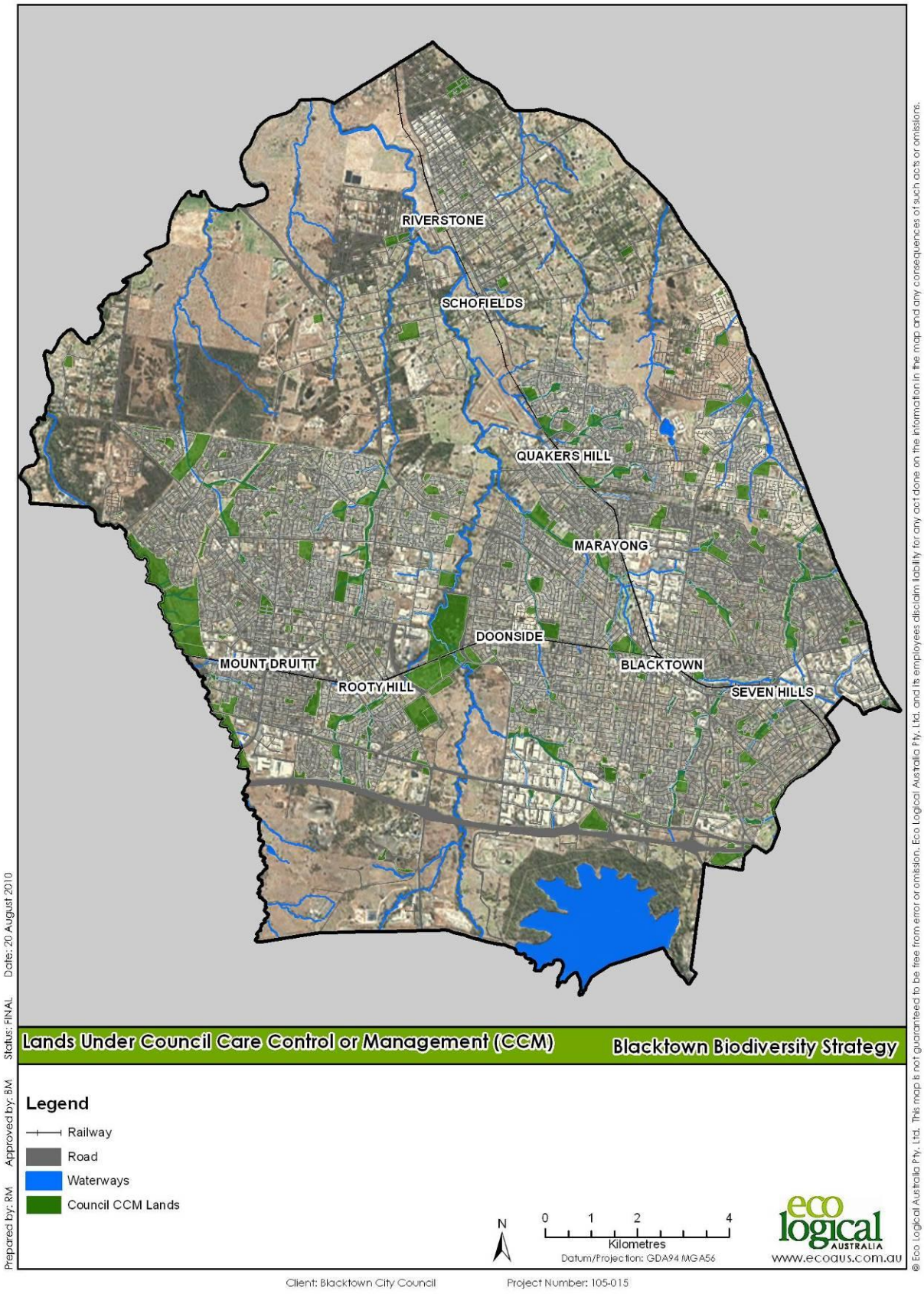


Figure 3: Lands under Council care, control or management

1.4 ABORIGINAL CULTURE AND BIODIVERSITY

The Aboriginal people of the Western Cumberland Plain refer to themselves as the Dharug. The three Clans of the Blacktown area include the Gomerigal - South Creek, Wawarawarry - Eastern Creek, and Warmuli - Prospect. Blacktown LGA derives its name from the original inhabitants of the area and has the largest urban Aboriginal population for any local government area in NSW with a community of some 7,055 people making up 2.6% of the population of the LGA (BCC Draft Reconciliation Action Plan, Nov 2009).

A study of *Aboriginal Cultural Values of the Native Vegetation of NSW* (Schnierer et al 2001) found that Aboriginal people traditionally had a strong relationship with the environment, and used natural resources according to their lore. Native vegetation was valued as a source of sustenance and medicine as well as having spiritual meaning and, in recent times, as educational, employment and recreational sites. Aboriginal environmental knowledge associated with native vegetation is another important cultural value.

The health of the land and the maintenance of biodiversity was, and remains, linked to the wellbeing of Aboriginal people, both physically and spiritually. Reconnection with traditional lands, or 'country', and associated natural resources is an important part of present day Aboriginal culture and identity (Schnierer et al 2001).

1.5 REPORT STRUCTURE

This Biodiversity Strategy was developed as described in the methodology (**Part 4 - Appendix A**) and is structured as follows:

- Part 1 - Outlines the role, vision, objectives and targets of the Strategy
- Part 2 - Describes the physical and statutory context, biodiversity values, threats and current management practices
- Part 3 - Identifies strategic actions for implementation
- Part 4 - Outlines the methodology employed to prepare the Strategy and provides technical appendices

2 Vision, objectives & targets

2.1 VISION

The Vision for this Biodiversity Strategy was developed during workshops with Council officers in 2009. The Vision is:

> *To conserve, restore and enhance biological diversity and ecosystem health, particularly threatened species, populations and communities, in the Blacktown Local Government Area.*

This is consistent with the vision and strategies set out in *Blacktown City 2025* and the *Blacktown City 2010/2013 Delivery Program* and *2010/2011 Operational Plan* which state:

> *Protect, restore and enhance Blacktown City's biodiversity.*

The vision for this Biodiversity Strategy is also consistent with Blacktown City Council's *Environmental Sustainability Policy* (2010) in regards to 'Our Land & Biodiversity':

> *Protect, restore and enhance Blacktown City's biodiversity.*

As well as Blacktown City Council's (2007) *Regeneration and Revegetation Strategy's* vision:

> *To protect the biological diversity of the remnant Endangered Ecological Communities within Council's open space network and maintain their ecological processes and systems.*

2.2 OBJECTIVES

Best practice biodiversity management is based on protecting, maintaining and expanding good quality remnant vegetation and fauna habitat, especially within ecological corridors, whilst ameliorating threats to those areas. This approach is the primary objective of this Strategy. Implementation of the Strategy will aim to:

- Conserve, restore and enhance remnant endangered ecological communities and the flora and fauna which they support within the LGA
- Recognise and respect the strong link between western Sydney's Aboriginal community and biodiversity
- Provide strategies for the effective long-term management and viability of remnant vegetation and ecosystems, including edge expansion and improved connectivity
- Inform appropriate planning controls to assist in achieving the vision and objectives of the Strategy
- Ameliorate threats to biodiversity
- Establish Blacktown City Council as a leader in establishing biodiverse-based carbon forests
- Ensure adequate communication within Council and with stakeholders, including the community, regarding the conservation and management of bushland remnants and biodiversity
- Provide appropriate management structures and resources to support the Strategy

Specific goals listed in the *Blacktown City 2010/2013 Delivery Program* of relevance to this Biodiversity Strategy include:

- *Complete regeneration projects*
- *Deliver programs that align with the Environmental Sustainability Policy to work towards protecting remnant endangered ecological communities on Council owned and controlled land*
- *Deliver engagement activities that align with the Environmental Sustainability Policy to enhance understanding and work towards positive behavioural change in our community*

Strategic Action Plans in **Part 3** of this Strategy address the objectives listed above.

2.3 BIODIVERSITY TARGETS

Biodiversity targets are needed to assess performance of the Strategy. This section outlines relevant targets for NSW and the two catchments Blacktown LGA sits within; the Hawkesbury-Nepean and Sydney Metropolitan catchments. Strategic biodiversity targets for the Blacktown LGA are identified. More specific, quantifiable targets can be determined at the operational plan level on a site by site basis.

2.3.1 NSW biodiversity targets

The NSW Government State-wide natural resource condition targets, as described in State Plan Priority E4 (NSW Government 2006), provide the structure for the NSW Monitoring, Evaluation and Reporting (MER) program. The MER Strategy was endorsed by the NSW Government in 2006 and is now being revised. The MER Strategy was established to focus the resources of NSW natural resource and environment agencies and coordinate their efforts with Catchment Management Authorities, local government, landholders and other natural resource managers to establish a system of monitoring, evaluation and reporting on natural resource condition.

The MER Strategy identifies State-wide natural resource condition targets to be achieved[1] as follows:

- By 2015 there is an increase in native vegetation extent and an improvement in native vegetation condition
- By 2015 there is an increase in the number of sustainable populations of a range of native fauna species
- By 2015 there is an increase in the recovery of threatened species, populations and ecological communities
- By 2015 there is a reduction in the impact of invasive species
- By 2015 there is an improvement in the condition of riverine ecosystems
- By 2015 there is an improvement in the ability of groundwater systems to support groundwater dependent ecosystems and designated beneficial uses
- By 2015 there is no decline in the condition of marine waters and ecosystems
- By 2015 there is an improvement in the condition of important wetlands, and the extent of those wetlands is maintained
- By 2015 there is an improvement in the condition of estuaries and coastal lake ecosystems
- By 2015 there is an improvement in soil condition

[1] http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/296649/MER-Strategy.pdf

- By 2015 there is an increase in the area of land that is managed within its capability
- Natural resource decisions contribute to improving or maintaining economic sustainability and social well-being
- There is an increase in the capacity of natural resource managers to contribute to regionally relevant natural resource management

2.3.2 Catchment targets for biodiversity

The Catchment Management Authorities (CMAs) prepare Catchment Action Plans (CAPs) that set catchment and management targets for natural resources management. Blacktown LGA is located within catchments that are managed by the Hawkesbury-Nepean CMA and Sydney Metropolitan CMA. Biodiversity targets set by these CMAs are tabulated below.

Table 1: Hawkesbury-Nepean CAP biodiversity targets for 2007-2016

CATCHMENT TARGETS (CT)	MANAGEMENT TARGETS (MT)
CT B1 Native vegetation extent: Maintaining the extent of native terrestrial vegetation in all landscapes	**MT B1-1 Revegetation to replace clearing:** Establishing 2,300 Ha of native vegetation through revegetation
	MT B1-2 Conservation of indigenous vegetation: Conserving 2,300 Ha of native vegetation through landholder action
CT B2 Native vegetation condition: Improving native vegetation condition in Mitchell landscapes, priority fauna habitat, and/or areas that are part of the network of regional corridors	**MT B2-1 Remnant buffers:** Improving condition of native vegetation using active and passive regeneration of buffers around high priority, existing remnants
CT B3 Threatened species: Undertaking actions to assist in conservation of threatened species	**MT B3-1 Threatening process management:** Identifying and including in management plans activities classified as ‘threatening processes'
	MT B3-2 Threatened species action: Conserving threatened species, endangered populations and communities outside currently protected areas
CT B4 Invasive species: Reducing negative impacts of invasive species	**MT B4-1 Weed control:** Reducing weeds through primary weed control and eradicating new weed outbreaks and emerging weed threats
	MT B4-2 Maintenance of weed control: Sustaining progress of areas treated for invasive plant control
	MT B4-3 Threatening processes - pest animals: Including populations of invasive pest animal species in Threat Abatement Plans, and managing them according to the priorities in those plans
CT B5 Conditions favouring invasive species: Reducing conditions that favour invasive species through improving ecosystems	**MT B5-1 Action to reduce conditions that favour invasive species:** Reducing conditions that favour invasive species

CATCHMENT TARGETS (CT)	MANAGEMENT TARGETS (MT)
CT B6 Key native fauna populations: Improving sustainability of key native fauna populations	**MT B6-1 Icon species:** Identifying key species and populations through subcatchment action plans

Source: http://www.hn.cma.nsw.gov.au/infopages/2190.html

Table 2: Sydney Metropolitan CAP biodiversity targets

CATCHMENT TARGETS (CT)	MANAGEMENT TARGETS (MT)
Enhance ecological resilience and connectivity of bushland and aquatic habitats	**Systematic enhancement of connectivity of ecosystem processes**
CTB1 By 2016 the extent and condition of terrestrial native vegetation in all landscapes is maintained or improved	**MTB1.1** By 2016 all councils and land managers are making planning and management decisions based on best available knowledge
	MTB1.4 By 2016 there is an increase in the conservation and management of non reserved lands
CTB3 By 2016 there is an increase in the connectivity of terrestrial native vegetation	**MTB3.3** By 2016 there is an increase in the extent, condition and connectivity of regional biodiversity corridors
CTB4 By 2016 aquatic and terrestrial threatened species and Endangered Ecological Communities (EECs) and endangered populations are better conserved by implementing actions identified in the Priorities Action Statement	**MTB4.1** By 2009, CMA relevant priority actions in the Threatened Species Priorities Action Statement have been determined and are being implemented
CTB5 By 2016 the impact of terrestrial and aquatic invasive species on biodiversity is reduced by decreasing the number, distribution and impact of invasive weeds, pest animals and pathogens	**MTB5.1** By 2011 the Weed Management Strategy for the SMCMA region has been implemented and reviewed by key land managers in a coordinated manner
	MTB5.2 By 2011 action plans for priority pest animal species have been developed and implemented
	MTB5.3 By 2011 education and research programs investigating the distribution and spread of priority invasive species have been implemented

Source: http://sydney.cma.nsw.gov.au/index.php?option=com_remository&Itemid=116&func=startdown&id=367

2.3.3 Blacktown biodiversity targets and reporting

Strategic biodiversity targets for the Blacktown LGA have been identified for three broad areas:

- Western Sydney Parklands
- North West Growth Centre
- Remainder of the LGA - referred to in this Strategy as the 'established part of the LGA'

Different targets have been set for each of these areas because of their unique land use, planning and governance characteristics.

Western Sydney Parklands

Targets and reporting requirements for the Western Sydney Parklands are managed by the Western Sydney Parklands Trust with reference to the *Western Sydney Parklands Biodiversity Restoration Strategy* and contract specifications for on-ground work in priority areas within the ecological corridor, threat abatement work and ecological monitoring. A database has been created to receive results of monitoring and on-ground works. Results of performance will be reported to Council by the Trust in annual State of the Environment reports, commencing in 2010.

North West Growth Centre

Biodiversity certification has been granted over *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* (the Growth Centres SEPP). There are two targets for biodiversity within the North West Growth Centre:

- Firstly, approximately 2,000 Ha of good condition native vegetation will be conserved within areas zoned by the Growth Centres SEPP as Environment Conservation or Public Recreation and also through development controls identified by the SEPP and associated Development Code in the non-certified areas of the Growth Centre (e.g. the Airservices Australia site)
- The second target relates to offsetting proposed losses of biodiversity caused by development in the Growth Centre

Offsetting for the purpose of biodiversity enhancement and conservation will involve purchase of land and/or entering into conservation agreements over land. The main conditions to be satisfied for the area to receive the offset are stated in Sections 32 and 33 of the *2007 Biodiversity Certification Conditions*, and summarised as follows:

- Identified as Regional Biodiversity Corridors and Western Sydney Priority Areas on the map 'Regional Biodiversity Corridors and Priority Fauna Habitats' in the Hawkesbury Nepean Catchment Action Plan, and
- Generally meets the following criteria:
    - large remnants of intact native vegetation with the greatest potential for retaining biodiversity values over time
    - vegetation communities that are under-represented in the protected area network
    - areas of equivalent or better conservation value to that which are to be cleared within the Growth Centre
    - areas that contain habitat for threatened species, including, but not limited to, species to be affected by development of the Growth Centre
    - areas that have the highest cost effectiveness
    - conservation reserve design principles, such as size, boundary configuration and landscape context
    - previous land uses
    - likely threats (such as existing or future adjoining land uses)
    - availability (including the willingness of landowners to either sell land or place it under a conservation agreement). No land is intended to be compulsory acquired in order to meet any of the conditions of biodiversity certification
- First preference - occurs within the Cumberland Plain of Western Sydney

- Second preference - occurs within priority areas within the Hawkesbury-Nepean Catchment
- Third preference - occurs in grassy woodlands within the Hawkesbury-Nepean Catchment
- Fourth preference - occurs in grassy woodlands within the Sydney Basin
- Fifth preference - other lands within the Sydney Basin identified by DECCW

Section 38 of the *2007 Biodiversity Certification Conditions* requires DECCW, every four years, to review progress in achieving an overall improvement of maintenance of biodiversity values. The review will consider:

- An estimate of the amount of existing native vegetation, specified by vegetation community type, that has been cleared within the Growth Centre, including maps of known locations, within the four year period (or adjusted period)
- The amount of existing native vegetation that has been retained and protected within planning precincts
- The amount of revegetation and/or restoration that has occurred (or is planned to occur) within planning precincts
- An indicative estimate of the amount of existing native vegetation, and the amount of revegetated and/or restored areas, planned to be protected in the remaining precincts within the Growth Centre that are yet to be released
- An overview of any amendments to the SEPP or related measures that have occurred within the four year period (or adjusted period)
- Any recommendations that would improve the operation of the conditions of biodiversity certification including, but not limited to, any modifications or revisions to the conditions themselves and the arrangements for management and allocation of funds from the Conservation Fund
- Any other information that is considered relevant by the DECCW to assist in reviewing whether the SEPP, and any other relevant measures, will continue to lead to the overall improvement or maintenance of biodiversity values

Based on the information provided from the review, DECCW shall advise the relevant Minister on whether biodiversity certification should be maintained, modified, suspended or revoked.

Established part of the LGA

In this Biodiversity Strategy the 'established part of the LGA' refers to all land within the LGA except for land within the Western Sydney Parklands or North West Growth Centre. Strategic targets for the established part of the LGA are to be achieved within timeframes set under the Integrated Local Government Planning and Reporting Framework[2].

- Short-term targets to be met by June 2013
- Medium-term targets to be met by June 2017
- Long-term targets to be met by June 2021

[2] For more information refer to :

http://www.dlg.nsw.gov.au/dlg/dlghome/dlg_generalindex.asp?sectionid=1&mi=6&ml=9&AreaIndex=IntPlanRept

Performance reporting against these targets will be submitted in August 2013, August 2017 and August 2021. More frequent updates will be made through annual operation plan reporting and environmental reporting.

The following biodiversity targets (**Table 3**) have been derived from an analysis of existing conditions within the established part of the LGA. The targets provide for a net increase in the area of native vegetation and fauna habitat in good condition, and an increase in the area that is protected and managed in reserves and within biodiversity corridors. Although this Biodiversity Strategy indicates long-term targets to be achieved in the next ten years, it is intended that these targets represent the beginning of a long-term trend (over the coming decades) toward improved protection and management of biodiversity within Blacktown LGA.

Table 3: Strategic biodiversity targets for the established part of Blacktown LGA

TYPE	2013 TARGET	2017 TARGET	2021 TARGET
Flora (including vegetation communities, threatened flora and threatened populations)	Protect all types of threatened flora species, populations and vegetation communities that have been recorded in the study area within reserves within ecological corridors or through incentives with affected private landowners Through monitoring, improve understanding of the number of threatened flora species and populations Improve condition and consolidate/expand edges of vegetation communities within reserves through weed control and planting, starting with high priority remnants in relatively good condition	Maintain good condition of remnants in reserves Improve condition of degraded vegetation communities within reserves through weed control and planting Improve connectivity between reserves by weed control and planting along ecological corridors, starting at edges of existing bushland	Maintain good condition of remnants in reserves Improve condition of degraded vegetation communities within reserves through weed control and planting Improve connectivity between reserves by weed control and planting along ecological corridors
Fauna (including threatened fauna and threatened populations, and pest species)	Protect habitat of threatened fauna species that have been recorded in the study area or are likely to be in the study area, in reserves within ecological corridors or through incentives with affected private landowners Through monitoring, improve understanding of the populations, types and distribution of native and pest fauna	Increase population size of threatened fauna species Increase the area of native fauna habitat outside reserves, e.g. frog ponds, suitable native plant species, nesting boxes in backyards and schools Decrease populations of pest fauna species in reserves, targeting pest species that represent the greatest threat to biodiversity	Increase population size of threatened fauna and other native fauna species Decrease populations of pest fauna species in reserves, targeting pest species that represent the greatest threat to biodiversity
Carbon sequestration	Implement process to identify specific areas suitable for planting for carbon sequestration	Plant for carbon sequestration	Plant for carbon sequestration

Part 2

Physical & Statutory Context

3 Planning and policy framework

3.1 INTERNATIONAL CONVENTIONS AND TREATIES

The need for biodiversity planning has its origins in a number of international conventions that Australia signed in the 1990s.

Rio Summit

The United Nations Conference on Environment and Development, also known as the Rio Summit or Earth Summit, was a major United Nations conference held in Rio de Janeiro in 1992. The Rio Summit resulted in the following documents:

- Rio Declaration on Environment and Development
- Agenda 21
- Convention on Biological Diversity
- Forest Principles
- Framework Convention on Climate Change

Both the Convention on Biological Diversity and Framework Convention on Climate Change were set as legally binding agreements.

1992 Rio Declaration on Environment and Development

This declaration reaffirmed the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June 1972, and highlighted the importance of including sustainability, or Environmentally Sustainable Development (ESD) principles, in decisions about land use and planning. Sustainability principles involve attempts to integrate environmental considerations into decisions about development. Australia's *National Strategy for Ecologically Sustainable Development 1992* defines ecologically sustainable development (ESD) as:

> *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.*

ESD is based on four key principles:

- The precautionary principle
- Intergenerational equity
- Conservation of biological diversity and ecological integrity
- Improved valuation and pricing of ecological resources

United Nations Convention on Biological Diversity

Of the four key ESD principles, the third is most directly relevant to biodiversity planning, and was given greater importance by the United Nations Convention on Biological Diversity (ratified by Australia in 1993).

This Convention provided a foundation for the conservation and sustainable use of biological resources by requiring the participating countries to develop and implement biodiversity strategies. It emphasises the need for biodiversity conservation to extend across the entire landscape, rather than being limited to special places or issues. As a signatory nation, Australia is bound to develop and implement strategies that will ensure the conservation and sustainable use of its biological resources.

Agenda 21

Local Agenda 21 (LA21) is a program that provides a framework for implementing sustainable development at the local level. LA21 aims to build upon existing local government strategies and resources (such as corporate plans, vegetation management plans and transport strategies) to better integrate environmental, economic and social goals.

LA21 was first described in Agenda 21 - the global blueprint for sustainability that was agreed at the United Nations Conference on Environment and Development in 1992 (the Rio Summit). Chapter 28 of Agenda 21 identifies local authorities as the sphere of governance closest to the people, and calls upon all local authorities to consult with their communities to develop and implement a local plan for sustainability - a 'Local Agenda 21'.

Other international agreements

Other international agreements that are significant for particular aspects of biodiversity include:

- *Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA) and Bonn Convention*: These agreements provide for co-operation between the Governments of Australia, China and Japan to protect waterbirds that migrate between these countries. The EPBC Act Protected Matters Search for Blacktown LGA identified twelve migratory bird species (refer to **Appendix F** for details)
- *The Ramsar Convention:* This convention provides protection to wetlands identified as being of international significance. It provides a framework for national action and international co-operation for the use of wetlands and associated sites. There are no Ramsar sites within the Blacktown LGA
- *Kyoto Protocol:* The Kyoto Protocol is a major international agreement requiring developed countries to meet national targets for greenhouse gas emissions over the five-year period from 2008 to 2012, to address the threat of climate change. These targets amount to an average of five per cent against 1990 levels over the five-year period 2008-2012. Australia ratified the Kyoto Protocol in December 2007, joining 177 other member countries

3.2 NATIONAL FRAMEWORK

As a result of being signatory to these treaties and conventions, Australia has taken some significant steps to meet its obligations under these treaties.

Intergovernmental Agreement on the Environment

This agreement was made in 1992 and provides for a co-operative approach to environmental management. It was signed by the Commonwealth, State and Territory Governments and the Australian Local Government Association. It recognises the co-ordinating role of the Commonwealth in matters of national environmental significance. It specifically recognises the role of local government in developing and implementing environmental policies.

Draft National Biodiversity Conservation Strategy 2010-2020

The *Draft National Biodiversity Conservation Strategy 2010-2020* replaces the National Strategy for the Conservation of Australia's Biological Diversity, which was agreed in 1996.

National Local Government Biodiversity Strategy 1998

The Biological Diversity Advisory Council (BDAC) worked with local governments from each State and the Northern Territory to develop a strategy for local governments to include biodiversity as a mainstream part of local government activities. The National Local Government Biodiversity Strategy was endorsed by unanimous vote at the National Local Government General Assembly in November 1998. The document represents an agreed local government position at the national level on the management of biodiversity.

Other national strategies

A number of other national strategies and policies are relevant to the management and conservation of biodiversity such as the Commonwealth Wetlands Policy, National Water Quality Management Strategy, the National Forest Policy Statement and the National Weeds Strategy. Most of these identify broad policy statements that outline principles for the management of biodiversity.

Commonwealth legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) provides a national scheme for environmental protection and biodiversity conservation. It incorporates referral mechanisms and environmental impact assessment processes for projects of national significance. Triggers for referral to the Commonwealth include Endangered Ecological Communities (EECs) and Critically Endangered Ecological Communities (CEECs) such as Cumberland Plain Woodland, endangered species and JAMBA/CAMBA species.

3.3 NSW FRAMEWORK

NSW Biodiversity Strategy

At the state level, the most significant initiative relating to biodiversity protection has been the preparation of the *NSW Biodiversity Strategy 1999-2003*. This strategy recognises the collaborative responsibility of the community, Local and State Governments, and the importance of local planning in biodiversity conservation. It provides guidance to Councils to prepare and implement biodiversity plans.

The *NSW Biodiversity Strategy* has been supported by *Biodiversity Planning Guidelines for Local Government*. This publication was commissioned by NSW National Parks and Wildlife Service and was prepared to assist Councils in implementing the Strategy. It includes guidelines on planning and facilitating biodiversity conservation.

The *NSW Biodiversity Strategy* is currently being revised by NSW Industry and Investment, and DECCW. A discussion paper (*Department of Environment and Climate Change NSW 2008*) has been issued seeking comments on the revised Strategy. The paper indicates that the revised strategy would adopt the NSW natural resource management targets for 2015 and proposes a 20-year strategic goal of widespread biodiversity recovery and increasing landscape connectivity with the involvement of the whole community. It also proposes a 100-year vision of minimising the effects of climate change on biodiversity so that ecological change does not equate to loss of diversity.

NSW Biodiversity and Climate Change Adaptation Framework

The NSW Government has developed the *NSW Biodiversity and Climate Change Adaptation Framework* which sets out how NSW agencies have tackled climate change up to 2009. DECCW has developed an *Adaptation Strategy for Climate Change Impacts on Biodiversity*. The Framework sets out how NSW public sector agencies are tackling climate change through raising awareness, conducting research, monitoring, and implementing actions to help protect biodiversity, including threatened plants and animals. Priority focus areas are building and managing the reserve system, conservation planning to link public and privately-owned land, managing wildlife, using climate change adaptation science, research and modelling, managing natural resources, environmental planning, and communication, awareness raising and capacity building.

Metropolitan Strategy - Draft North West Subregional Strategy

The Draft *North West Subregional Strategy* translates objectives of the NSW Government's Metropolitan Strategy and State Plan to the local level and nominates the following key directions for biodiversity:

- Apply sustainability criteria for any new greenfield land release areas
- Identify a metropolitan-wide approach to protecting and managing rural resource lands
- Consider regional biodiversity matters to inform principal LEPs
- Manage the impacts of tourism on the natural environment
- Protect regionally significant open space, bushland and foreshore reserves

Action E2.2.1 of the Draft *North West Subregional Strategy* requires the NSW Government and Councils to consider regional biodiversity matters to inform principal LEPs. Action E2.2.2 requires Council to seek advice from DECCW on relevant information and mapping regarding biodiversity.

Cumberland Plain Recovery Plan

DECCW (2010) encourages local councils to prepare or review biodiversity strategies consistent with the *Cumberland Plain Recovery Plan* (CPRP) (Action 4.3 of the CPRP). Biodiversity strategies should guide protection, management and strategic investment in threatened biodiversity. Actions that are identified in the Recovery Plan that have been endorsed by Blacktown Council are included in the Strategic Action Plans in **Section 7**.

Other plans

- NSW State Plan - refer to **Section 2.3**
- Hawkesbury-Nepean Catchment Management Authority Catchment Action Plan - refer to **Section 2.3**
- Sydney Metropolitan Catchment Management Authority Catchment Action Plan - refer to **Section 2.3**
- NSW Invasive Species Plan 2008-2015 – provides actions that aim to prevent and effectively manage the introduction and spread of invasive species so that this significant threat is minimised
- NSW Wetlands Management Policy 1996 - aims to assist in the protection of wetlands in good condition, rehabilitate degraded wetlands where feasible, and support appreciation of wetlands

NSW legislation

Other NSW legislation that have implications for biodiversity conservation, include the following:

- *Local Government Act 1993* (NSW): This Act has recently been amended, and has now incorporated ESD considerations (including biodiversity conservation) as a key aspect of Council operations. Other changes to the Act also require the preparation of Plans of Management (POMs) for all Council owned land, and provides for the classification of land into, amongst other things, natural areas and various sub-categories. The POMs must be consistent with the natural values of these categories. Additionally, this Act has a range of other provisions that allow for appropriate management of operational land and infrastructure, provide educational services, set rates and charges, issue orders and have a range of enforcement powers
- *Environmental Planning and Assessment Act 1979* (NSW) *(EP&A Act).* The principal planning legislation for the State providing a framework for the overall environmental planning and assessment of development proposals. The Act provides for the preparation of a number of environmental planning instruments (including SEPPs and LEPs)
- *Threatened Species Conservation Act 1995* (NSW) (TSC Act): This requires that Councils consider the impact on threatened species in fulfilling their statutory responsibilities under the EP&A Act. It also provides for the preparation of Species Recovery Plans that may bind Council to certain actions or activities on Council owned land
- *Catchment Management Act 2003* (NSW): Total Catchment Management (TCM) is aimed at achieving co-ordinated and sustainable management of natural resources on a water catchment basis
- *National Parks and Wildlife Act 1974* (NSW): Provides for establishment/management of National Parks and other conservation reserves (for example, through Voluntary Conservation Agreements) and the protection of flora and fauna species
- *Native Vegetation Act 2003* (NSW): Regulates the clearing of native vegetation on all land in NSW except for land listed in Schedule 1 of the act, including National Parks, State Forests and urban areas.
- *Noxious Weeds Act 1993* (NSW): Identifies noxious weeds, control measures, public and private responsibilities and provides a framework for the management of noxious weeds across NSW
- *Fisheries Management Act 1994* (NSW): This Act aims to preserve fish stocks, habitats and species and to maintain and promote ecologically sustainable development whilst ensuring the commercial viability of fisheries. It allows for listing of threatened species, habitat, communities and processes in a similar manner to the TSC Act
- *Water Management Act 2000* (NSW): This Act controls the extraction of water, how water can be used, the construction of works such as dams and weirs, and the carrying out of activities on or near water sources in NSW
- *Rural Fires Act 1997* (NSW): Requires the preparation of bushfire management plans

State Environmental Planning Policies

State planning instruments apply to certain areas or issues within the LGA, as shown in **Figure 4**. These include:

- *State Environmental Planning Policy (SEPP) 29 - Western Sydney Recreation Area*
- SEPP 30 - St Marys

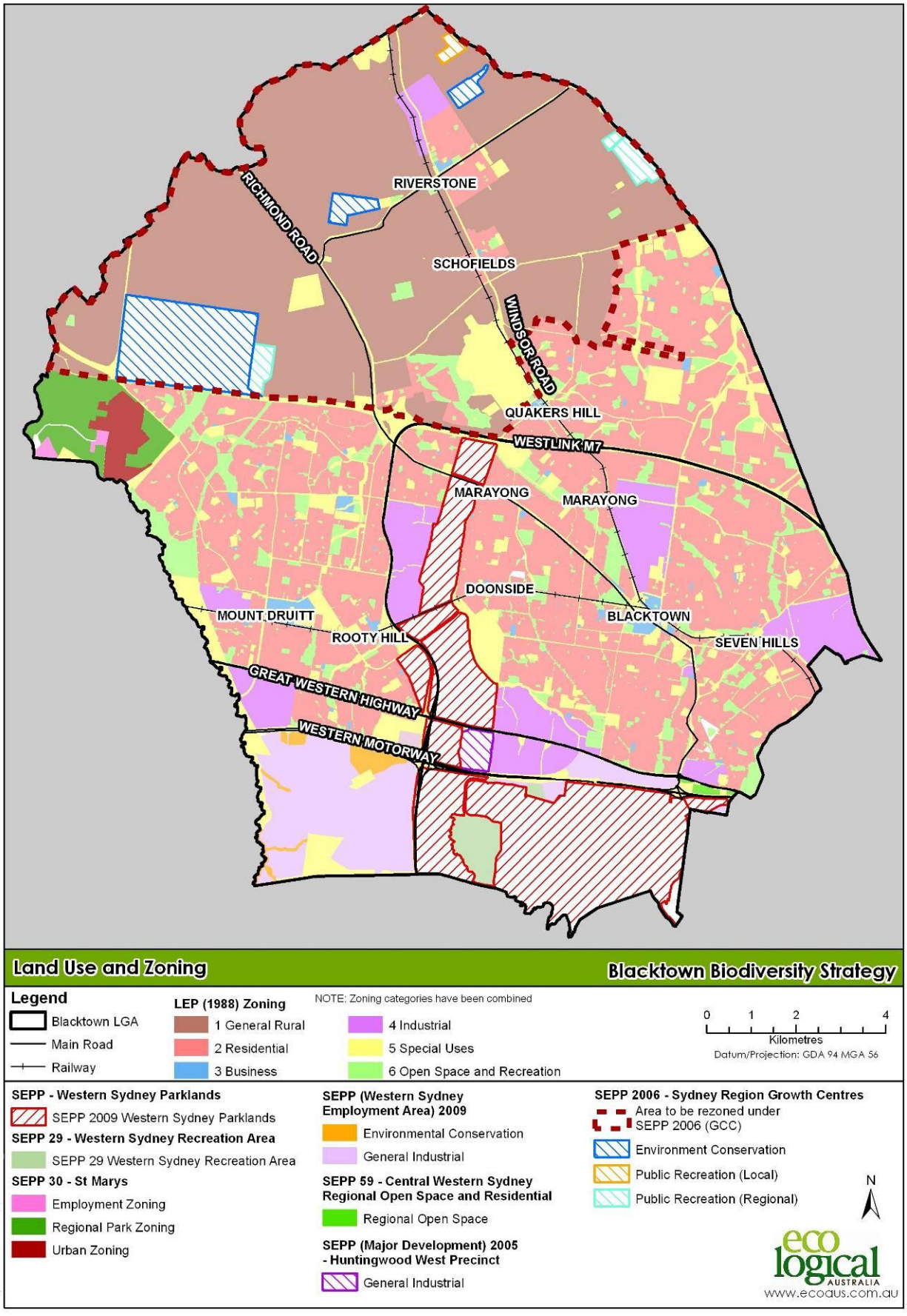


Figure 4: Land use and zoning

- *SEPP (Western Sydney Employment Area) 2009 (Formerly SEPP 59 - Central Western Sydney Regional Open Space and Residential)*
- *SEPP (Major Development) 2005 - Huntingwood West Precinct*
- *SEPP 2006 - Sydney Region Growth Centres*
- *SEPP - Western Sydney Parklands*
- *SEPP 19 - Bushland in Urban Areas*. Aims to protect and preserve bushland in urban areas where land is reserved or zoned for public open space

Strategic Actions as included in the Strategic Action Plans in this Biodiversity Strategy have been grouped according to those relevant to the North West Growth Centres, the Western Sydney Parklands and the remainder of the LGA. The planning and biodiversity management frameworks of the North West Growth Centre and Western Sydney Parklands are outlined below.

North West Growth Centre

The NSW Government's Metropolitan Strategy *City of Cities: A Plan for Sydney's Future* (2005) identified the need to supply new 'greenfield' land for development over the next thirty years. The planning requirements for the North West and South West Growth Centres are defined by the *SEPP (Sydney Region Growth Centres) 2006*. The North West Growth Centre is approximately 10,000 Ha within the LGA boundaries of the Hills, Blacktown and Hawkesbury. It will contain about 70,000 new homes across sixteen precincts.

In 2007 the NSW Minister for Environment conferred Biodiversity Certification on the Growth Centres SEPP. Areas across the growth centres have been identified as being either "certified" or "not certified" (refer to **Figure 5**). These areas are defined as:

- ***Certified Lands*** *– Biodiversity issues have been incorporated and offset into a regional conservation assessment and plan. The assumption is that existing native vegetation in these areas may be lost to development. This means that landowners, Councils and developers will not have to consider biodiversity issues individually in Development Applications within the certified areas.*

- ***Non Certified Lands*** *– Biodiversity values have been identified as significant through regional assessment. This means that landholders, Councils and developers will have to consider biodiversity issues subject to the relevant development controls in the SEPP and the requirements of Environmental Planning and Assessment Act 1979. Further conditions have been placed on some of the non certified lands as shown in Figure 5. These are:*

    - ***Condition 12*** *– existing native vegetation must not be cleared over these lands unless it is in accordance with a plan of management or unless the clearance has been agreed to by DECCW*

    - ***Condition 14*** *– a further detailed biodiversity assessment must be undertaken over these areas during or before the preparation of the relevant precinct plan under the Growth Centres Development Code.*

Through certification, funds are available to either purchase areas of existing native vegetation for the primary purpose of biodiversity conservation, or to enter into private conservation agreements both inside and outside the Growth Centres.

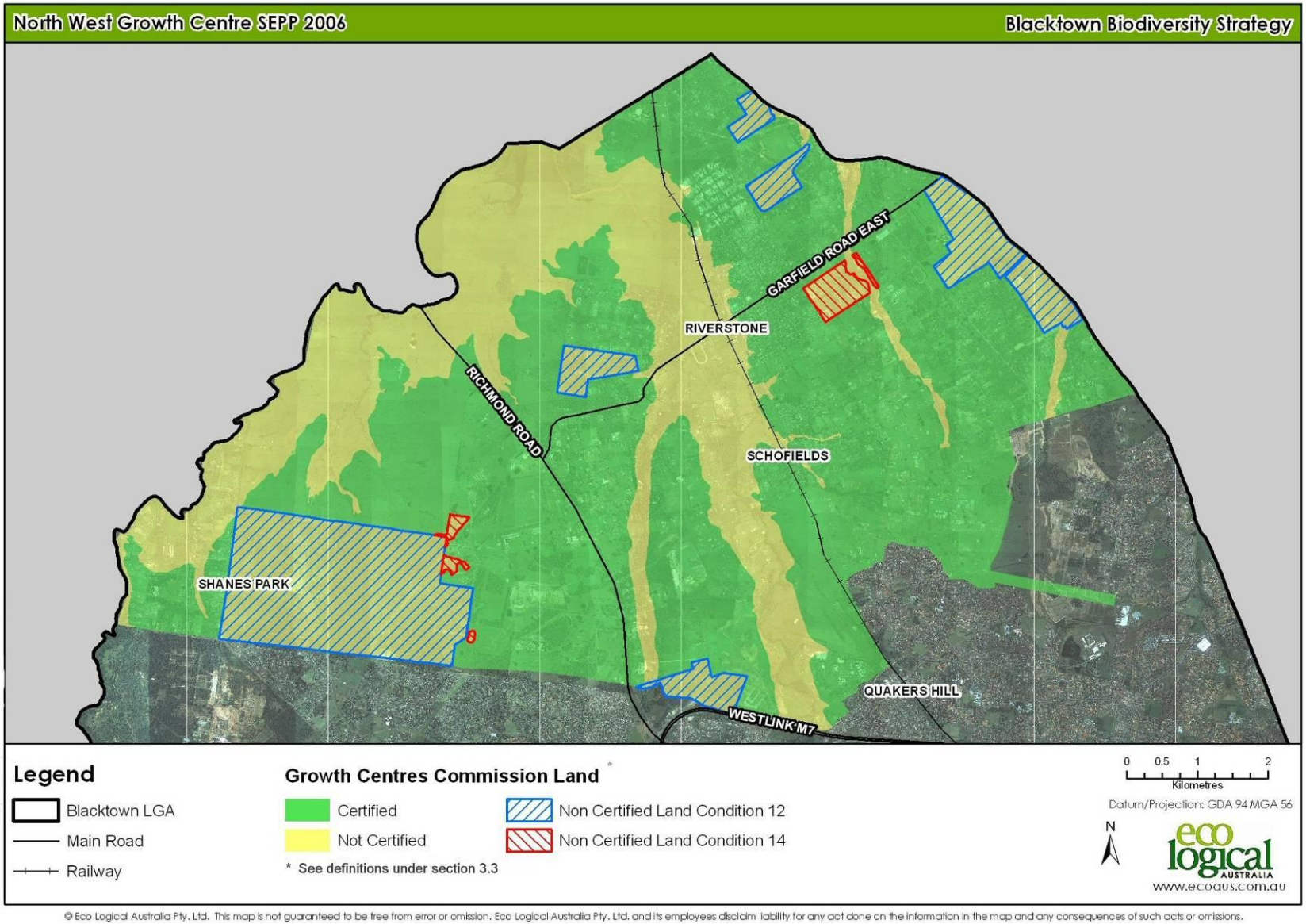


Figure 5: North West Growth Centre SEPP 2006

The Growth Centres SEPP establishes planning guidelines for land which contains identified high quality native vegetation and other environmental qualities. Some areas within the Growth Centre have been rezoned for environmental conservation or recreational purposes. These are shown in **Figure 4.**

Detailed precinct planning being conducted by the Department of Planning will identify additional areas for conservation, e.g. riparian corridors. In addition, the SEPP and associated Development Code include objectives and provisions that support the retention of native vegetation through incorporation into land use planning outcomes such as local parks, town centres, schools, and other areas required to be set aside for community uses. Some existing habitat areas of native vegetation may also be incorporated into subdivision patterns and road design without adversely affecting the development yield of areas. Parcels of land under care control or management of Blacktown City Council will remain under Council responsibility until gazetted as new precincts.

Western Sydney Parklands

The Western Sydney Parklands are defined by a State Environmental Planning Policy. This is one of the largest urban parklands in the world, stretching over 27 km from Quakers Hill in the north to Leppington in the south. The northern part of the parkland lies within the Blacktown LGA and includes Nurragingy Reserve. A Plan of Management is being developed for the parklands by the Western Sydney Parklands Trust.

The Western Sydney Parklands has an ecological corridor mainly along Eastern Creek. A *Biodiversity Restoration Strategy* (Eco Logical Australia 2006a) sets out the framework for staged rehabilitation of the ecological corridor based on the principle of protecting, maintaining and expanding the 'best' ecological areas while reducing threats to biodiversity[3]. Work is currently underway on behalf of the Western Sydney Parklands Trust to implement the Restoration Strategy, including bush regeneration, threat abatement works and ecological monitoring.

3.4 BLACKTOWN LOCAL ENVIRONMENTAL PLAN

Existing (August 2009) land use zones within the LGA are depicted in **Figure 4**. Approximately 80%[4] of the LGA falls within local planning zones defined by the *Blacktown Local Environmental Plan (LEP) 1988* and supported by the *Blacktown Development Control Plan 2006*. The 1988 LEP and 2006 DCP do not have specific clauses that relate to biodiversity management. However, areas of relatively high biodiversity value tend to fall within areas of open space within the following land use zones[5]:

- 2(a) Residential (a)
- 5(a) Public Uses (General)
- 6(a) Public Recreation
- 6(d) Environmental Protection
- Public Recreation - Regional under the Growth Centres SEPP

[3] A Biodiversity Restoration Strategy was also prepared for South and Ropes Creeks' corridors (ELA 2006b)

[4] Note that the northern part of the LGA that is currently zoned General Rural under the 1988 LEP will be progressively rezoned under SEPP 2006 Growth Centres.
Refer to http://www.gcc.nsw.gov.au/media/Pdf/Corporate/q+agcs.pdf for further information

[5] These zones will significantly change under the new LEP which is being developed by Council and will be publicly exhibited in 2011

At the time of compiling this Strategy, LEP 1988 is being revised by Blacktown City Council in response to the NSW Government's release of a standard LEP instrument in 2006 for local councils across NSW. The new draft LEP for Blacktown LGA is expected to be placed on exhibition in 2011. Strategic Actions are included in the Strategic Action Plans in this Strategy which are relevant to the new draft LEP, including development of an offsetting strategy and clauses for environmental planning instruments.

3.5 PLANS OF MANAGEMENT

Council's reserves are identified in **Figure 6**. Actions from each Plan of Management prepared address the management of:

- Threatened vegetation communities
- Native flora and fauna species and habitats
- Weeds
- Feral animals
- Vandalism
- Bushfire
- Drainage
- Infrastructure
- Heritage
- Community interaction and involvement

These reserves include a mix of bushland, mown open space for informal recreation, sports fields, playgrounds, and ancillary buildings and infrastructure (e.g. amenity blocks and picnic tables).

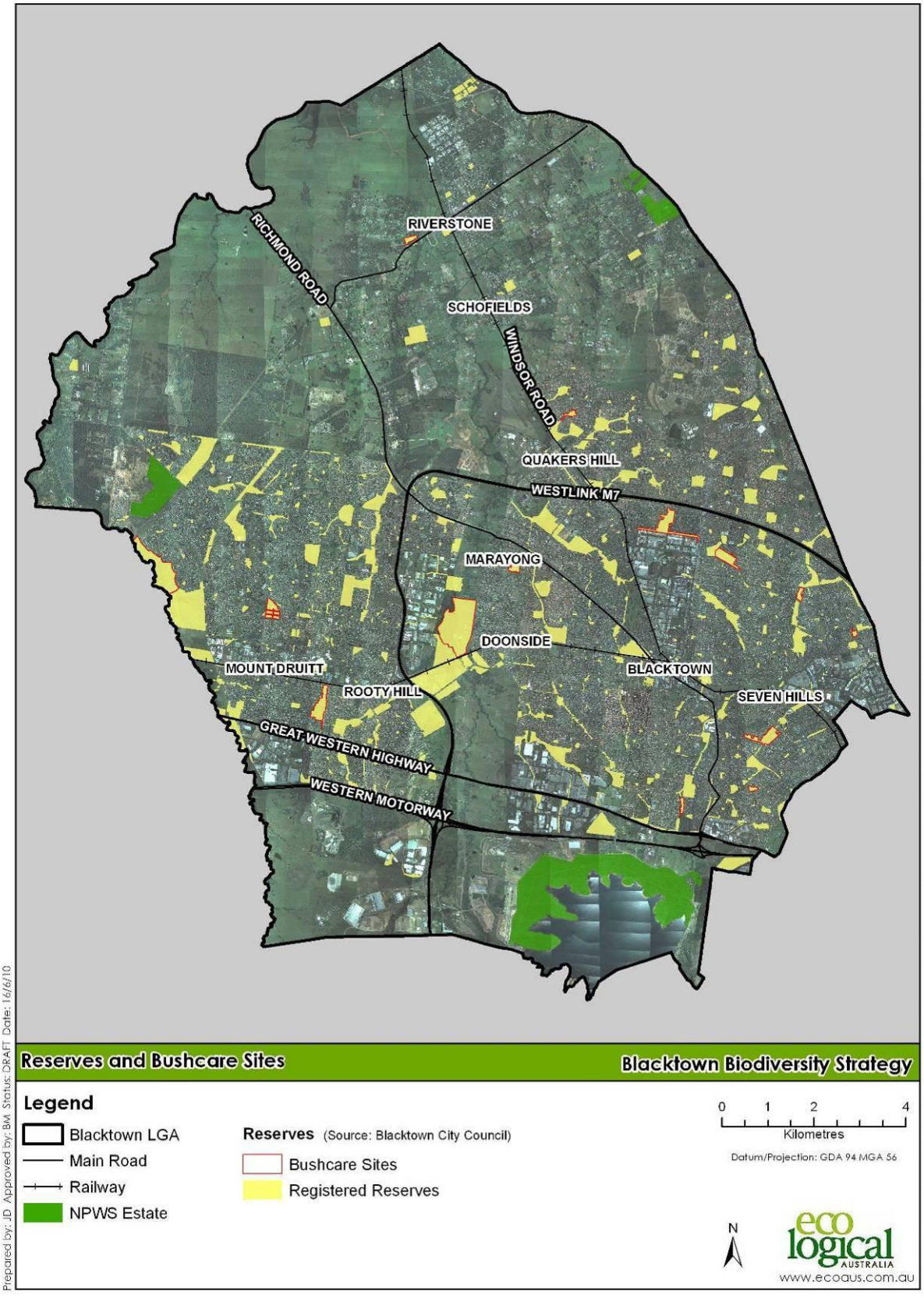


Figure 6: Reserves and Bushcare sites

Plans of Management that have been prepared are tabulated below:

Table 4: Council's Plans of Management

RESERVE NO.	RESERVE NAME	YEAR ADOPTED
163	Whalan Reserve	2008
218	Tregear Reserve	2008
271	Dr Charles McKay Reserve	2007
641	Toucan Reserve	2006
202	Mitchell Reserve	2009
350	Neoblie and surrounding Reserve	2008
260	Cudgegong Road, Rouse Hill	2004
46	Metella Reserve Wetland	2004
408	Timbertop Reserve (currently being reviewed)	2003
464	Faulkland Reserve	2008
NA	Greystanes Creek	1998
585	Reycroft Avenue, Quakers Hill	2009
593	Oppy Reserve	2009
828	Eastern Neighbourhood Park	2009
728	The Manse	2009
12 & 204	Nurragingy Reserve (Draft)	2004
20 & 21	Blacktown Showground & Francis Park (Draft)	2004
44 & 437	William Lawson Park (Draft)	1997
489	The Rooty Hill & Morreau Reserve (Draft)	1997
106	Bert Saunders Reserve (Draft)	1997
392	Lalor Park Reserve (Draft)	1997
13 & 852	Aquilina Reserve (Draft)	1998
396	RAAF Memorial Park (Proposed to be prepared in 2010-2011)	
392	Banks Reserve (Proposed to be prepared in 2010-2011)	
209	Duncan (Proposed to be prepared in 2010-2011)	
Generic Plans of Management		
	Sportsground	2008
	Parks	2010
	General Community Use	2010
	Natural Area - Bushland (Currently under review and scheduled for Council consideration/endorsement in 2011)	1996
	Natural Area - Creeklines and Drainage Areas (Currently under review and scheduled for Council consideration/endorsement in 2011)	1996

Council's reserves are classified as community land under the *Local Government Act 1993* (NSW). The reserves contain areas that correspond to a number of categories described in the *Local Government (General) Regulation 2005* (NSW), including:

- Natural areas (bushland, wetland, escarpment, watercourse or foreshore)
- Sportsground
- Park
- Area of cultural significance
- General community use

Guidelines and core objectives are provided in the regulation for each category of land. Additionally, the LEP defines objectives for land use zones within each reserve.

3.6 COUNCIL'S EXISTING STRATEGIES AND PROGRAMS

Blacktown City Council is highly regarded and awarded for its proactive and innovative approaches to environmental sustainability. Biodiversity in Blacktown LGA is currently managed by Council through numerous programs and initiatives, through the implementation of relevant strategies and Plans of Management for specific reserves. Existing Council strategies relevant to biodiversity management are summarised below. Relevant actions have been incorporated in this Biodiversity Strategy.

These programs relate to all sectors of the community, including residents, businesses and schools. There are also several programs that address Council's environmental performance.

Table 5: Council's existing strategies and programs relating to biodiversity management

NAME (listed alphabetically)	DESCRIPTION
Adopt A Road	The Adopt A Road program is a way that families, groups, clubs or businesses can enhance the level of community pride in their surrounding area by reducing litter, thus improving the visual amenity and habitat quality of roadsides and surrounds.
Blacktown City 2025 - Delivering the Vision Together	This document provides the framework for Council's programs and is built on the principles of economic, social and environmental sustainability, and governance, or the Quadruple Bottom Line.
Blacktown's Climate Change Adaptation & Action Plan *(under development)*	A key objective of the BCCAAP is to capture and record Council's progress to date in reducing greenhouse gas emissions and provide an indicator of where further improvements are needed to ensure the continued success of our climate change programs. Importantly the BCCAAP will provide a means for monitoring and reviewing progress towards Council's reduction goal. It will also document the range of measures to reduce greenhouse gas emissions, targeting areas where emissions, or emissions growth, are most significant, as well as areas where abatement potential is greatest. The BCCAAP will also identify areas of vulnerability to climate change and recommend actions to assist in adapting to the impacts of climate change.
Blacktown Street Tree Planting Strategy	This Strategy applies to landscape precincts throughout the Blacktown LGA. It provides species selection lists, tree planting details and specifications.
Blacktown Solar City	Blacktown City Council was the first, and is one of only seven, solar cities in Australia. The Blacktown Solar City Project is a $37 million investment from the Australian Government with consortium partners including BP Solar, Integral Energy, Landcom, Big Switch Projects, ANZ and Council. It aims to assist business, industry and the community save energy, drive the use of Australia's leading-edge solar energy technologies, reward energy efficiency and solar power generation, and showcase to all Australians the economic and environmental benefits of wiser energy choices.
Bushcare Program	Council's Volunteer Bushcare Program has 14 active volunteer groups. These groups meet on a monthly basis and assist Council in achieving significant community and environmental outcomes. On site activities vary and include weeding, planting, mulching and litter collection.

NAME (listed alphabetically)	DESCRIPTION
	Council coordinates Bushcare activities at the following reserves (as shown in **Figure 6**): • Banks Reserve, Sparman Crescent, Kings Langley • Bill Colbourne Reserve, Hill End Road, Doonside • Blacktown Creek, Myrtle Street, Prospect • Dr Charles McKay Reserve, Beames Avenue, Mt Druitt • Duncan Park, Superior Avenue, Seven Hills • Faulkland Crescent Reserve, Faulkland Crescent, Kings Park • Knudsen Reserve, Garfield Road West, Riverstone • Morgan Power Reserve, Vardy's Road, Kings Langley • Nurragingy Reserve, Knox Road, Doonside • Pied Piper Reserve, Beethoven Street, Seven Hills • RAAF Memorial Park, Belmore Avenue, Mt Druitt • Snowy Reserve, Tuross Street, Seven Hills • Tregear Reserve, Wilkes Crescent, Tregear • Whitehaven Reserve, Lyndel Close, Quakers Hill
Bushland Regeneration and Revegetation Strategy	This Strategy applies to Blacktown's remnant vegetation and addresses the management of ecological communities occurring on land within Council's ownership or care, control and management. It does not cover remnant vegetation occurring within private property. It provides the framework for development of more detailed plans of management (see below). Council's Bushland Regeneration & Revegetation Strategy (2007) will be superseded by this Biodiversity Strategy.
Cities for Climate Protection Program	Blacktown City Council became a member of the Cities for Climate Protection (CCP) Program in January 2001. As part of the CCP, Council has conducted office lighting retrofits, purchased energy saving office equipment, installed solar panels on some council buildings, trialled energy efficient street lighting technology and continues to purchase Greenpower. There has been an overall abatement of approximately 1,012 tonnes of greenhouse gases from Blacktown City.
Clean Up Australia Day	Council participates annually in Clean Up Australia Day, School's Clean Up Day and Business Clean Up Day. A cleaner environment results in improved habitat conditions.
Earth Hour	Council participates in Earth Hour. Earth Hour is an innovative event to raise awareness of practical solutions to climate change by switching off lights and non-essential equipment for one hour.
Eco-Active Schools Program	The Eco-Active Schools Program is an environmental sustainability grants program tailored specifically to schools within the Blacktown Local Government Area. The program provides funding for schools to undertake environmental improvement projects, e.g. focused on energy, water and food sustainability.
Energy Performance Contract	Council entered into an Energy Performance Contract on 31 December 2007 in an effort to reduce energy and water consumption on Council's top 14 sites. An Energy Performance Contract is an initiative used that allocates capital to replace inefficient energy consumers and implement the most up to date tools and devices. The Energy Performance Contract complements Council's Energy and Water Savings Action Plans and will also contribute towards meeting the targets that will be set in the Blacktown Climate Change Action and Adaptation Plan (under development).

NAME (listed alphabetically)	DESCRIPTION
Environmental Expo Program	The annual Environmental Expo provides residents with the opportunity to learn more about environmental initiatives such as reducing water and energy consumption, waste reduction, rainwater tanks, natural cleaning, worm farming, permaculture, composting, and bushcare programs from promotional material provided at the various stalls and by participating in activities or talking with stall holders. The Expo is an opportunity for Council to showcase environmental programs, and representatives from across Council attend as do external groups and organisations such as Sydney Water's Streamwatch program, Blacktown Solar City, Blacktown and District Environment Group, Conservation Volunteers Australia, Permaculture Sydney West and the Ethnic Communities Council.
Environmental Health Strategy	The *Environmental Health Strategy* includes existing and proposed programs that address air quality, water quality, noise reduction, greenhouse gas reduction and sustainability (superseded in 2010 by the *Environmental Sustainability Framework*).
Environmental Stormwater Management Program	The stormwater management service charge currently funds a high percentage of rehabilitation works in riparian corridors across the LGA.
Environmental Sustainability Education for Schools	Council supports environmental sustainability education in schools through the Sustainable Schools Newsletter, environmental education for primary schools and a Teachers Network.
Environmental Sustainability Framework	The *Environmental Sustainability Framework* (ESF) encompasses the many established environmental strategies, plans and policies of Council, lists current actions and identifies future emerging environmental issues. Where appropriate it includes partnerships and collaborative approaches. This is in keeping with the provisions of the Integrated Planning and Reporting Framework for Local Government. The ESF is based on the themes in the *Environmental Sustainability Policy* being Our Assets, Our People & Settlements, Our Water & Catchments, Our Land & Biodiversity and Our Climate & Atmosphere.
Environmental Sustainability Policy	The purpose of the *Environmental Sustainability Policy* is to provide a rationale, set of objectives and focus areas by which Council undertakes to conserve and enhance our local environment. The Policy also seeks to formalise Council's demonstrated commitment to lead by example by embedding best-practice environmental sustainability management within Council operations and to move towards our goal of becoming a carbon neutral organisation.
Landscape Strategy	Provides landscape design guidelines to define the character of different elements such as city gateways, transport corridors, town centres, urban bushland and open space.
National Tree Day	Council participates in National Tree Day and Schools National Tree Day. National Tree Day is an annual event at locations across the LGA within each of the five wards that make up Blacktown LGA. Participants include schools, corporate and community groups, and residents.
Open Space Maintenance Strategy	This Strategy provides Council with an agreed direction for open space maintenance to enable maintenance standards to be achieved. The Strategy applies to Council's sports fields, picnic areas, play areas, trails, vegetation belts, bushland, passive recreation areas and environmental reserves.

NAME (listed alphabetically)	DESCRIPTION
Plans of Management	Council have a number of Generic Plans of Management (PoM) which are based on the categorisation of land within the *Local Government Act 1993* (NSW). These include generic PoMs for Sportsgrounds, Parks, General Community Use, Natural Area - Bushland and Natural Area - Waterways. In addition to these, Council have a series of site specific PoMs. Refer to **Table 4.**
Plant Giveaways	Council implements an extensive tree giveaway program during Local Government Week, annual Travelling Tree giveaways, school and community group giveaways and a general residents' tree giveaway.
Springboard for Sustainability	The objective of Springboard for Sustainability is to create a common understanding and approach to sustainability, to give sustainability practical and grounded meaning and to ensure sustainability is embedded not only in our programs but also our processes.
State of the Waterways Management Plan	The *State of the Waterways Management Plan* contains information on the current condition and values of the waterways and catchments in the Blacktown LGA and looks at the potential to improve the condition and values. The Plan details targets for the condition of each of the 22 individual waterways and their catchments and provides a list of recommended actions to help achieve the targets by 2020. The stormwater management service charge currently funds a high percentage of rehabilitation works in riparian corridors across the LGA.
Supporters of Sustainability Challenge	The Supporters of Sustainability (SOS) Challenge is a community engagement program that provides practical tips to residents on how they can reduce their impact on our environment, by making a few small changes in their home and everyday life. The SOS Challenge involves two stages. In Stage One, residents were asked to make a written commitment/pledge to reduce their impact on the environment. Stage 2 of the Challenge involves offering incentives and activities for those who had already pledged their commitment.
Sustainability Street™	Sustainability Street is an innovative community-based training program that nurtures at a grass roots level all aspects of sustainable living, including water and energy efficiency, waste reduction, enhancing local biodiversity and reconnecting community relationships.
Sustainable Living Workshop Series	Council hosts environmental workshops for the community including Natural Cleaning, Worm Farming and Composting, No-Dig Gardening, Chooks in Backyards, Sustainability at Home and Carbon Neutral Christmas. Due to the overwhelming response and interest received, the workshop series has been expanded to include biodiversity education, sustainable food and resource (waste) management including Natural Pest Control, Introduction to Biodiversity, Wildlife of Blacktown and Spotlighting Tours, Permaculture Principles, Seed Raising, Pickling & Preserving, Eco Food Shopping and UR-3R Alternative Waste Treatment Facility tours.

NAME (listed alphabetically)	DESCRIPTION
Regenesis	Regenesis is an innovative community engagement, revegetation, carbon sequestration and carbon-trading project, jointly conducted by Blacktown City Council and its Sister City, Liverpool Plains Shire Council. The Regenesis project is a first for local government in Australia. Regenesis engages with the local Blacktown community to plant native trees and communities of vegetation to sequester carbon in response to climate change. Planting communities of vegetation also helps to improve biodiversity, salinity and water quality outcomes. Plantings are designed to meet carbon trading requirements so that landholders who take part will benefit from receiving tradeable carbon certificates.
Tree Preservation Orders	Blacktown LEP 1988 requires Council approval for removal or trimming of trees, and replacement with suitable native species.
Water and Energy Savings Action Plans	Council is progressively implementing the actions contained in Council's Energy and Water Savings Action Plans to save energy and water through infrastructure improvements.

3.7 MANAGEMENT BY AGENCIES

The roles of agencies in managing biodiversity within Blacktown LGA are summarised in **Table 6**. These organisations have policies, guidelines, etc. related to their activities.

Table 6: Agency responsibilities

AGENCY	RELEVANCE TO BIODIVERSITY MANAGEMENT
Commonwealth Department of Environment, Water, Heritage and the Arts	Matters of National environmental significance
Department of Environment, Climate Change and Water	National Parks, threatened species and communities, implementation of the Priority Action Statement (i.e. recovery plans and threat abatement) Controlled Activity Approvals
Department of Planning	Growth Centres, planning and biodiversity certification, offsetting
Hawkesbury-Nepean Catchment Management Authority Sydney Metropolitan Catchment Management Authority	Implementation of Catchment Action Plans
NSW Industry & Investment	Noxious weeds and fisheries
Roads and Traffic Authority	Main roads, culverts, bridges
Rural Fire Service	Bushfire planning and management
Sydney Water	Water quality monitoring, water and sewer infrastructure/management Operation and maintenance of Second Ponds and Caddies Creeks
Utilities' providers, e.g. Telstra, Energy Australia, AGL	Easements and infrastructure
Western Sydney Parklands Trust	Western Sydney Parklands

4 Physical features of study area

The Blacktown LGA is a rapidly developing area covering about 24,000 Ha, situated approximately 35 km from Sydney on the Cumberland Plain in the heart of Western Sydney. It encompasses a mix of older established areas and new release developing areas, totalling 47 suburbs. In 2006, the total population for the LGA was 271,710, representing 15.1% of Greater Western Sydney's population, making the Blacktown LGA the most populous within NSW.

Blacktown's diverse land use continues to attract developers. The main access points into and out of the Blacktown LGA are the Western Railway Line, the M2, M4 and M7 Motorways, and other major roads such as the Great Western Highway and Richmond Road.

4.1 TOPOGRAPHY AND SOILS

Figure 7 illustrates that the residual Blacktown soil landscape dominates the LGA. It is characterised by gently undulating rises on Wianamatta Group shales with local relief 10-30 m and slopes generally <5% but up to 10%. These soils are typically sodic, highly erodible and have poor fertility and drainage. Soil landscapes within the LGA are as follows:

- Alluvial, South Creek soil landscape is associated with the major drainage lines, e.g. Eastern Creek
- Alluvial, Berkshire Park soil landscape is found in the north west of the LGA
- Erosional, Luddenum soil landscape is found in the eastern part of the LGA

Soil salinity, erosion and contamination in the LGA are being addressed through Council's:

- *Salinity Action Plan*
- *Soil Erosion and Sediment Control Policy*
- *Development of Contaminated Land Policy*

4.2 DRAINAGE

Council's 2005 *State of the Waterways Management Plan* identifies 22 permanently flowing creeks comprising 153 km of natural waterways and 230 km of defined drainage lines. The major waterways, e.g. Eastern Creek and Ropes Creek, are shown in **Figure 8**. These catchments primarily drain to the Hawkesbury-Nepean River or Parramatta River.

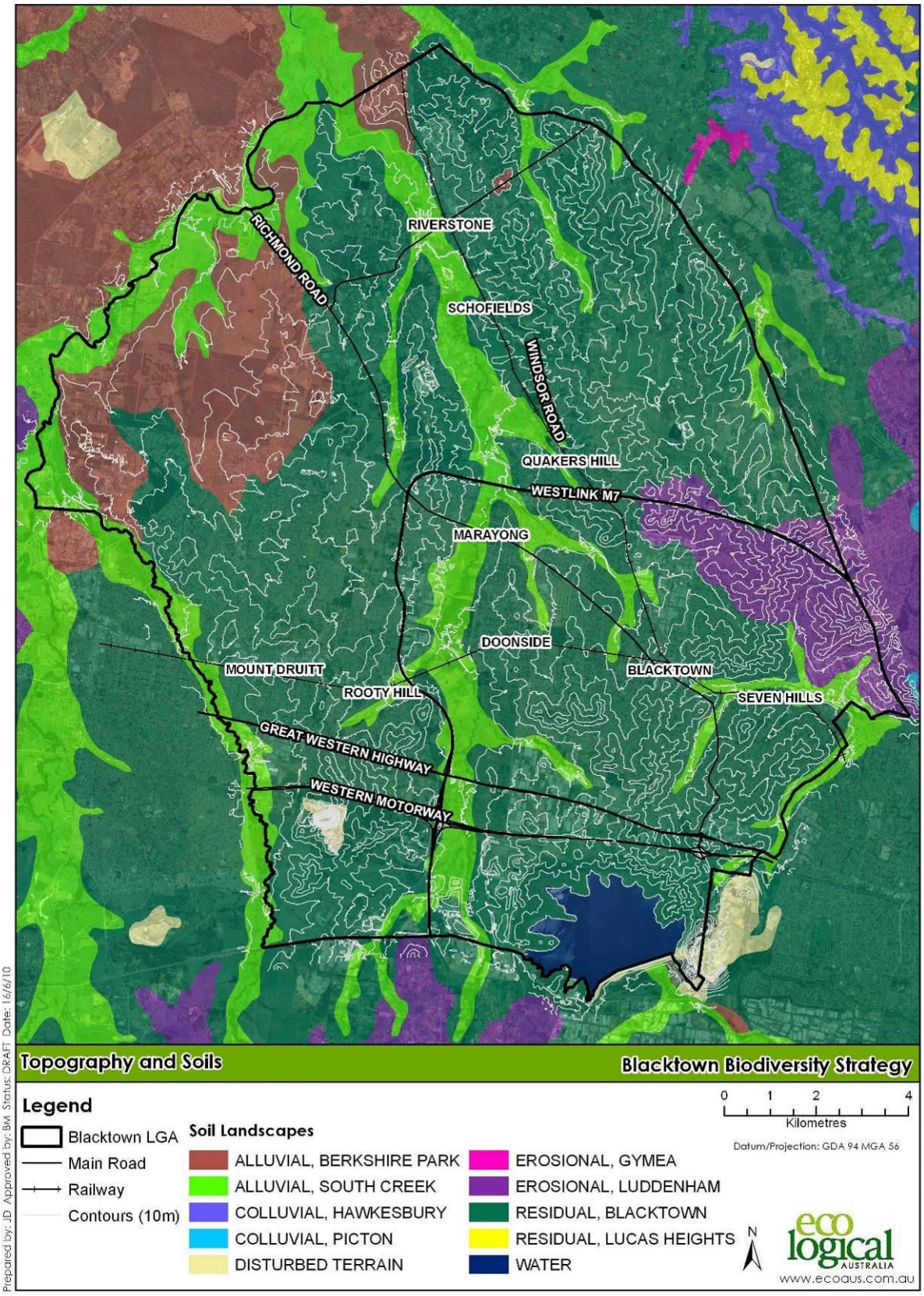


Figure 7: Topography and soils

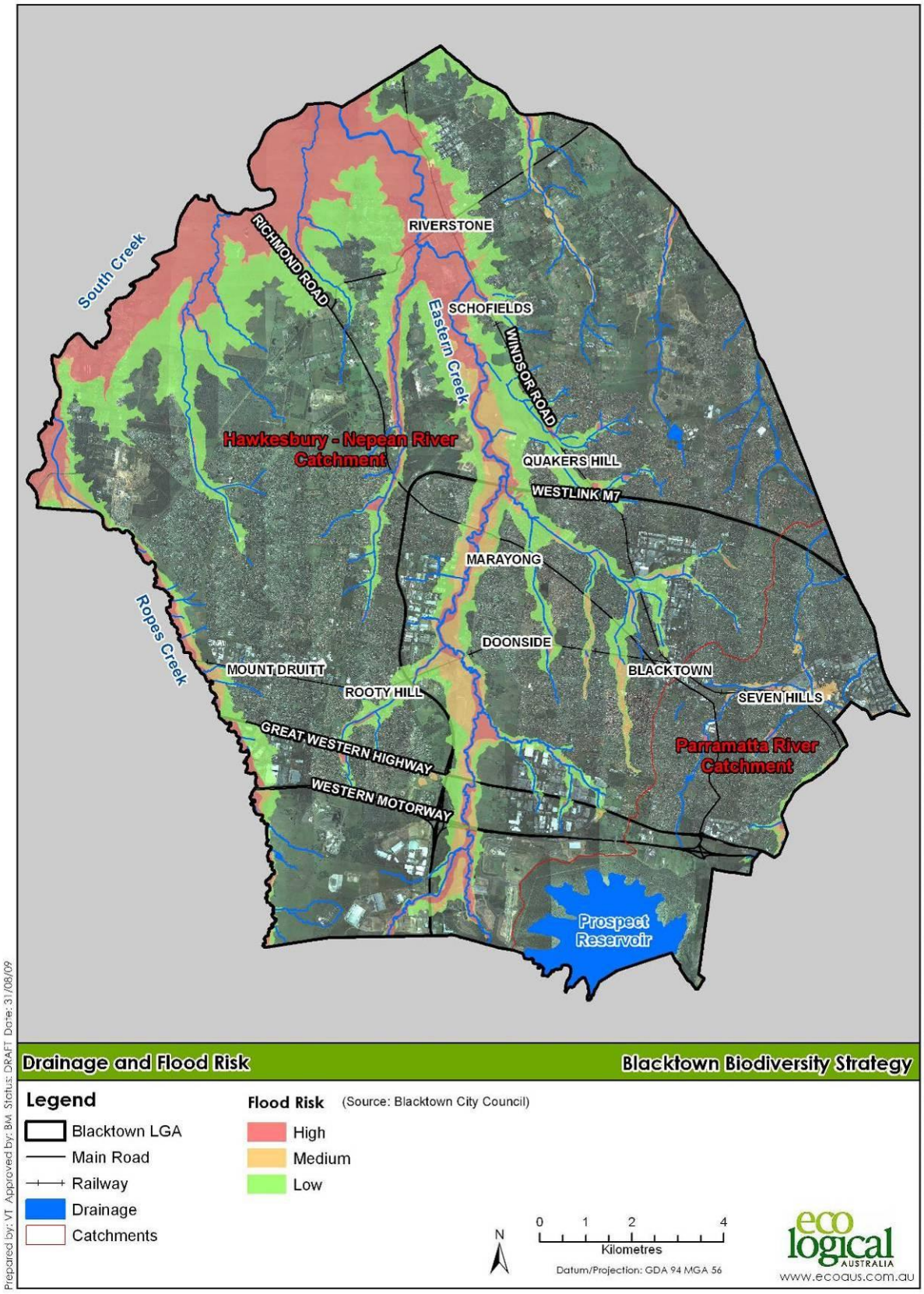


Figure 8: Drainage and flood risk

The waterways in the Parramatta River Catchment include:

- Greystanes Creek which flows into Toongabbie Creek and forms the border of the Blacktown and Holroyd LGAs
- Lalor Creek which flows into Blacktown Creek
- Grantham Creek which flows into Blacktown Creek
- Toongabbie Creek which flows into the Parramatta and Holroyd LGAs
- Blacktown Creek which flows into Toongabbie Creek

The waterways in the Hawkesbury-Nepean Catchment include:

- Caddies Creek which flows into The Hills LGA
- Second Ponds Creek which flows into The Hills LGA
- First Ponds Creek which flows into The Hills LGA
- Quakers/Burdekin Creek which flows into Eastern Creek
- Breakfast Creek (including its two main tributaries, Ashlar and Turner Creeks) which flows into Eastern Creek
- Bungarribee Creek which flows into Eastern Creek
- Reedy Creek which flows into Eastern Creek
- Eskdale Creek which flows into Eastern Creek
- Minchinbury Creek which flows into Eastern Creek
- Angus Creek which flows into Eastern Creek
- Bells Creek which flows into Eastern Creek
- Little Creek which flows into South Creek
- Stony Creek which flows into South Creek
- Ropes Creek (forming part of the border with the Penrith LGA) which flows into South Creek
- South Creek which forms part of the border with Penrith LGA

4.2.1 Flood risk

Figure 8 illustrates precincts of flood risk[6] as described in Council's *Floodplain Risk Management Plan* as follows:

- High Flood Risk: This precinct covers land flooded in a 100 year flood where floodwaters are deeper than about 800 mm and fast flowing. There would be a danger to people's safety and wading through floodwaters and evacuation would be difficult. Most of this precinct is within the creeks and detention basins or in areas close to the creek corridor
- Medium Flood Risk: This precinct covers all the rest of the land flooded in a 100 year flood that is not in the High Flood Risk precinct
- Low Flood Risk: Land in this precinct is above the level of the 100 year flood, but would be flooded in a probable maximum flood. These areas of the catchment are now recognised as being at risk (although a very small risk) of flooding. Most land uses would still be permitted in this precinct with very few development controls. Properties in this precinct would be included in

[6] Note that the map is indicative only and further advice on individual property flood affection should be sought from Council

flood awareness programs, evacuation plans and emergency planning to make sure that we have a community well-prepared for the next big flood

Actions associated with this Biodiversity Strategy need to avoid exacerbating the risk of flooding.

4.2.2 Waterway management

Many waterways in the LGA experience erosion, sedimentation, poor water quality, invasion of aquatic weeds, rubbish dumping and loss of riparian vegetation. Council's State of the Waterways Management Plan contains information on the current condition and values of the waterways and catchments in the Blacktown LGA and looks at the potential to improve the condition and values. Council is implementing a number of programs to ameliorate the degradation of waterways throughout the Blacktown LGA.

To improve water quality and bank stability (prevention of erosion and sedimentation), and impacts of development, Council is delivering a number of projects to rehabilitate riparian corridors with current projects focusing on Bungarribee, Breakfast and Ropes Creeks, as well as Mount Druitt Waterholes. Council is also developing controls and a handbook for development to help facilitate integrated water cycle management into urban areas (the *Integrated Water Cycle Management Development Control Plan* and *Developer Handbook for Water Conservation, Water Quality and Waterway Stability Treatment Measures*). These new controls aim to:

- Protect and enhance river systems
- Minimise potable water demand and wastewater generation
- Match the natural water runoff regime as closely as possible
- Mitigate the impact of development on water quality and groundwater
- Ensure any changes to existing groundwater regime do not adversely impact on adjoining properties
- Integrate water cycle management measures into the landscape and urban design to maximise amenity
- Minimise potential impact of development and other activities in the aesthetic, recreational and ecological values of receiving waters
- Minimise soil erosion and sedimentation from site disturbing activities
- Apply the principles of ecologically sustainable development in consideration of economic, social and environmental values in water management

As part of this Strategy, Council has also mapped key rubbish dumping hotspots and potential problem areas for aquatic weeds. This will help Council to become more proactive in the removal and management of dumped rubbish and the management of aquatic weeds. Potential problem areas or 'hotspots' for rubbish dumping in waterways and/or aquatic weeds are mapped in **Figure 9**.

This Biodiversity Strategy identifies actions to improve management of these potential problem areas. Refer to the Strategic Action Plans within this Strategy.

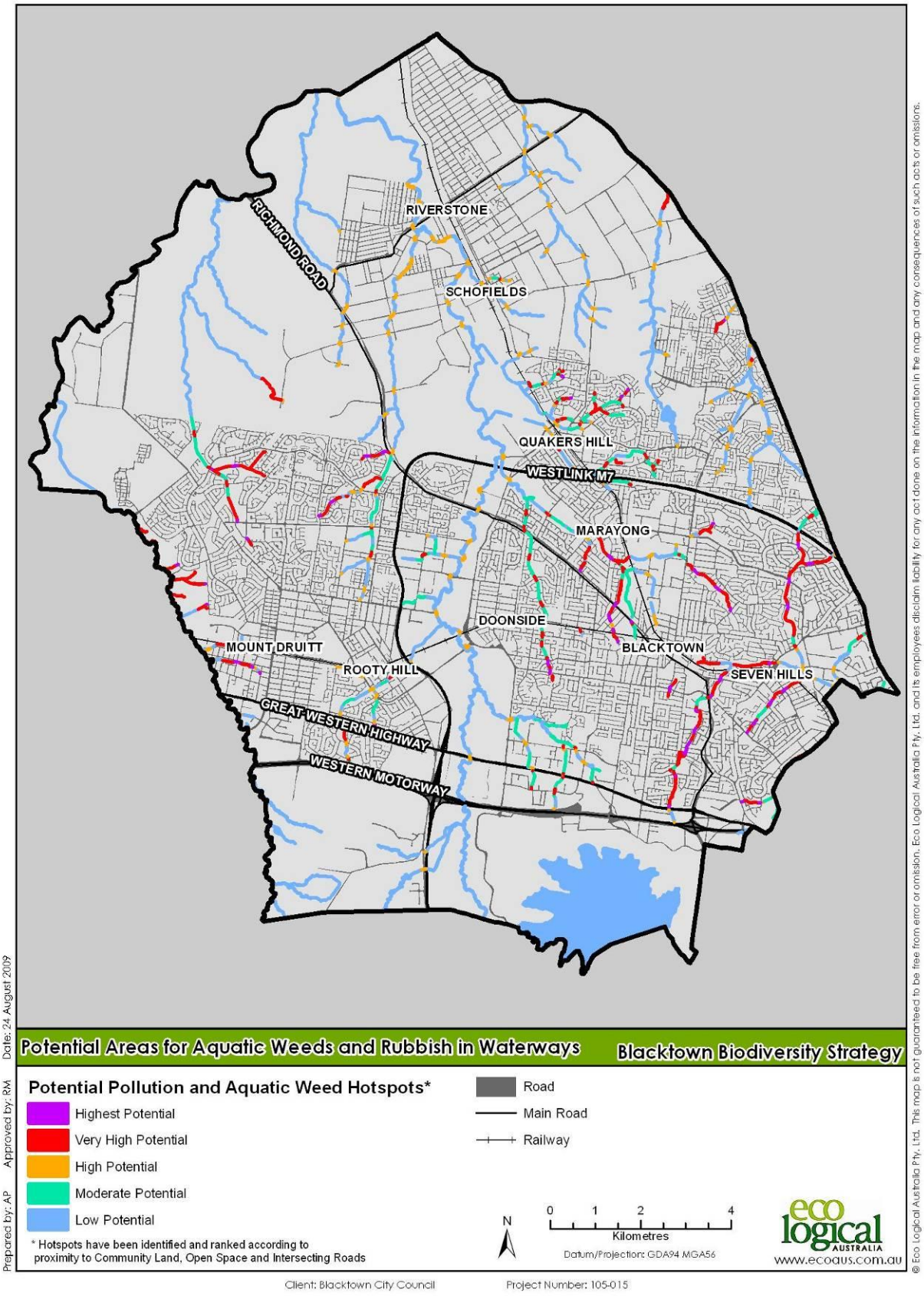


Figure 9: Potential areas for aquatic weeds and rubbish in waterways

5 Biodiversity values & opportunities

A summary 'report card' of the current biodiversity within Blacktown LGA is provided in **Appendix J.**

5.1 VEGETATION COMMUNITIES

Prior to European settlement, Benson & Howell (1990) suggest that the vegetation on shale soils in the Blacktown region would have comprised woodland dominated by *Eucalyptus moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum), and some *E. crebra* (Narrow-leaved Ironbark) on the hills. The understorey would have been grassy with patches of shrubs. The pre-1750 vegetation (based on modelling by Tozer 2000) is shown in **Figure 10**.

The current distribution of vegetation communities is shown in **Figure 11**.

This map was generated following an updated assessment of vegetation across the LGA in accordance with the methodology outlined in **Appendix E**. The community classifications are consistent with DECCW map data (NPWS 2002) (which uses some different classifications to the NSW *Threatened Species Conservation Act 1995* (NSW) (TSC Act). Further details about flora species associated with vegetation communities within the Blacktown LGA are available at:

http://www.blacktown.nsw.gov.au/environment/blacktowns-vegetation/vegetation-communities-of-blacktown.cfm

The area covered by each vegetation community in the LGA has been calculated and is presented in **Table 7.** The majority of extant vegetation is located:

- Along riparian corridors (mainly Alluvial Woodland)
- Around Prospect Reservoir (Shale Hills Woodland, Shale Plains Woodland)
- In the northern half of the LGA (Growth Centres land) (predominantly Alluvial Woodland, Shale Plains Woodland, Cooks River Castlereagh Ironbark Forest, Shale/Gravel Transition Forest)

Species typically associated with each vegetation community are described in NPWS (2002).

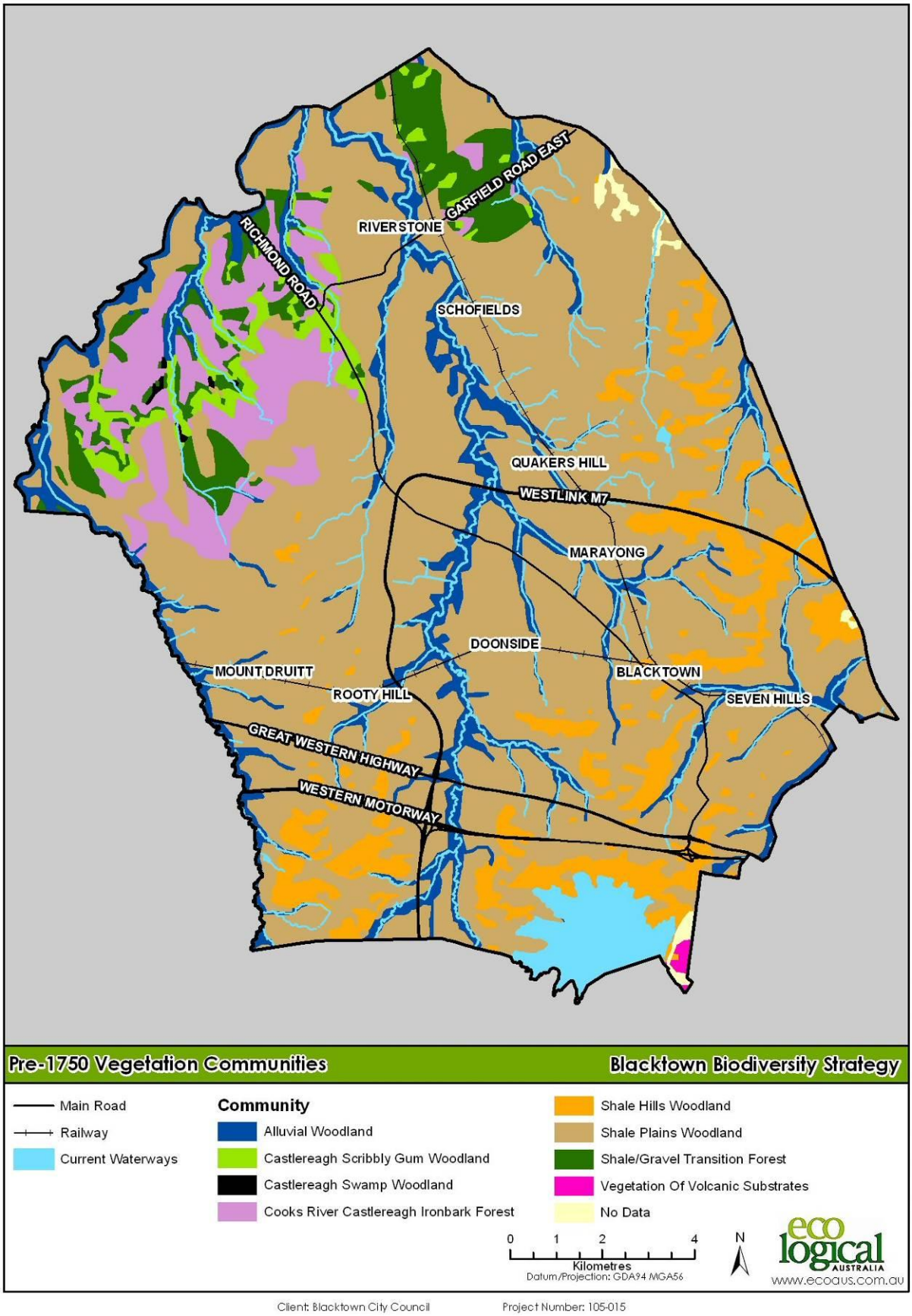


Figure 10: Pre-1750 vegetation communities - modelled distribution (Tozer 2000)

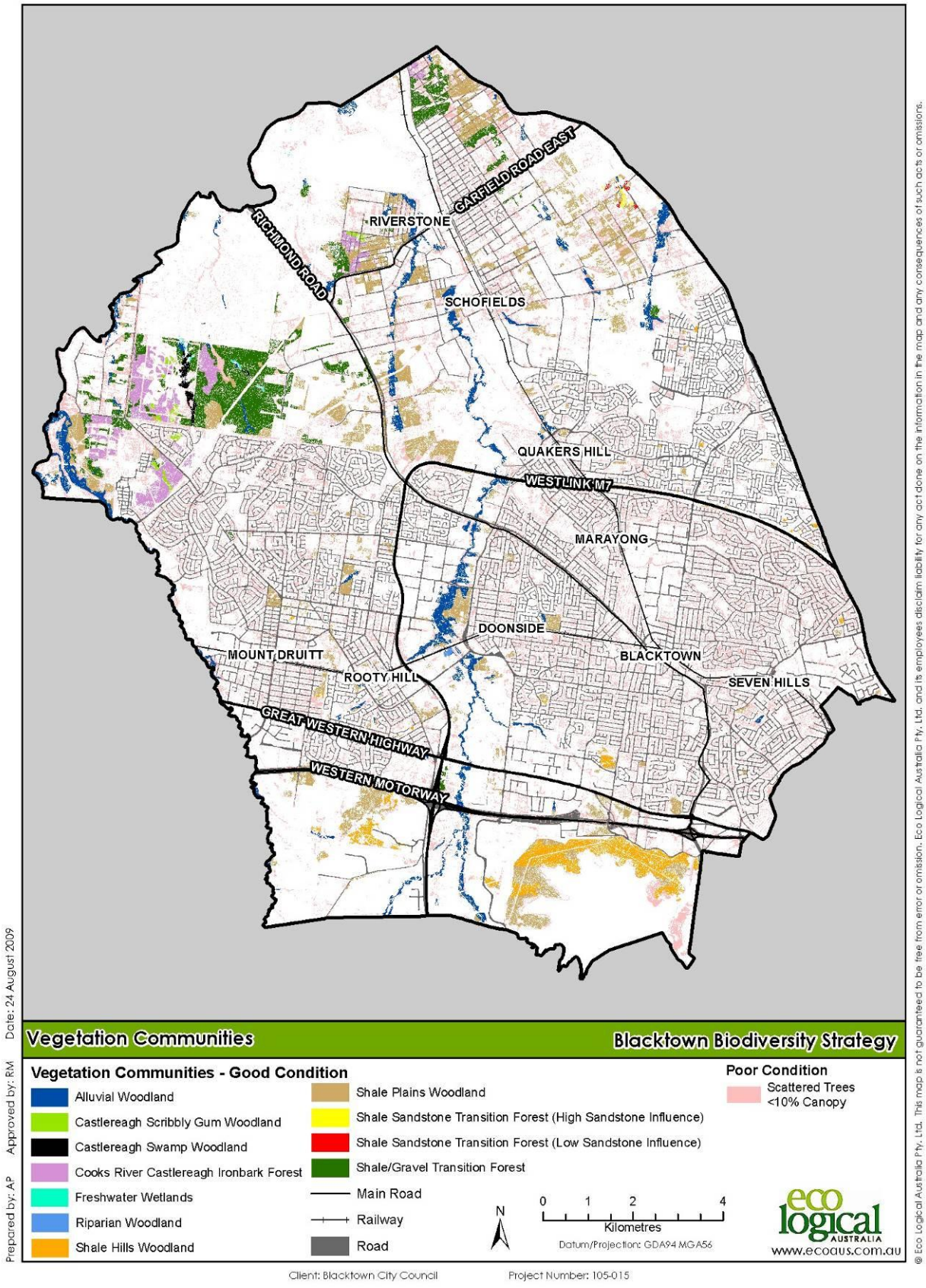


Figure 11: Vegetation communities

Table 7: Extant vegetation communities

VEGETATION COMMUNITY	EXISTING COVERAGE (Ha)	CCM* (Ha)
Alluvial Woodland	449.2	65.3
Castlereagh Scribbly Gum Woodland	16.9	1.9
Castlereagh Swamp Woodland	18.4	0
Cooks River Castlereagh Ironbark Forest	188.5	2.2
Freshwater Wetlands	3.1	0
Riparian Woodland	3.3	3.2
Shale Gravel Transition Forest	454.6	0.3
Shale Hills Woodland	210.5	11.8
Shale Plains Woodland	878.0	117.0
Shale Sandstone Transition Forest (High Sandstone Influence)	3.5	0
Shale Sandstone Transition Forest (Low Sandstone Influence)	3.7	0
Total Extant Vegetation Communities	**2229.7**	**398.20**
Scattered trees <10% canopy	2351.9	196.4

*Lands under the care, control or management of Blacktown City Council

5.2 FAUNA HABITAT

Terrestrial habitat within the Blacktown LGA is generally characterised by *Eucalyptus* woodland communities with varying levels of understorey density and open grasslands. These woodlands are represented by the Cumberland Plain ecological communities, dominated by Shale Plains Woodland, Shale Hills Woodland and Alluvial Woodland.

Forest and woodland communities within the LGA provide habitat with a distinct canopy and a grassy or a shrubby understorey structure. Fauna species are able to shelter, forage, nest and breed in these areas. The woodland habitat within the LGA provides a number of habitat features, including hollow-bearing trees, grassland, woody debris, dead trees, leaf litter and bush rock.

Creeks and wetlands provide aquatic freshwater habitat in the LGA. The *2005 State of the Waterways Management Plan* states that all the waterways of Blacktown are, or are being, destabilised by the current and past land use and generally trending towards a poor condition, if not already so. Actions are identified in this Strategy's Strategic Action Plans for rehabilitation of waterways and riparian corridors. An updated State of the Waterways Assessment and Management Plan is scheduled for 2010.

Edwin Vella of the Cumberland Bird Observers Club prepared a detailed report of the birds and other fauna he has observed in the Blacktown LGA since 1990 (**Appendix L**). The report describes the types of fauna, where they have been observed, the frequency of observations (e.g. common, rare visitor) and their habitat. Threats to native fauna are discussed.

5.3 THREATENED SPECIES, POPULATIONS & COMMUNITIES

There are a number of threatened species, populations and communities that occur within the Blacktown LGA that are nominated under the *Environmental Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) and/or TSC Act. These are listed in **Appendix F** and summarised below. Further details about threatened species, populations and communities are available from:

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_species.aspx
http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

5.3.1 Commonwealth

An EPBC Act Protected Matters database search was conducted on 28 January 2011 for the Blacktown LGA to identify matters of National environmental significance. There are 12 flora species, 13 fauna species and two fish species listed as threatened under the EPBC Act occurring within the Blacktown LGA. Three communities are listed under the EPBC Act:

- Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest (critically endangered ecological community)
- Shale/Sandstone Transition Forest (endangered ecological community)

The database search identified 12 migratory species of international importance that are either known or are likely to occur within the Blacktown LGA. These species are listed as migratory or marine under the EPBC Act, which refers to species listed under the following International Conventions:

- Japan-Australia Migratory Bird Agreement (JAMBA)
- China-Australia Migratory Bird Agreement (CAMBA)
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)

5.3.2 State

A NSW Wildlife Atlas database search[7] was performed on 7 January 2011 for the Blacktown LGA. There are seven vegetation communities within the Blacktown LGA that are listed under Schedule 1 of the TSC Act as Endangered Ecological Communities (EECs).

[7] Refer to http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp for more details

Table 8: Classifications of vegetation communities

TSC ACT CLASSIFICATION	NPWS (2002) MAP CLASSIFICATION*
Cumberland Plain Woodland**	Shale Hills Woodland
	Shale Plains Woodland
Shale/Sandstone Transition Forest	Shale/Sandstone Transition Forest (High Sandstone Influence)
	Shale/Sandstone Transition Forest (Low Sandstone Influence)
Sydney Coastal River-flat Forest	Alluvial Woodland is a sub-group of River Flat Eucalypt Forest on Coastal Floodplain
Sydney Turpentine Ironbark Forest	Turpentine Ironbark Forest
Castlereagh Swamp Woodland	Castlereagh Swamp Woodland
Cooks River/Castlereagh Ironbark Forest	Cooks River/Castlereagh Ironbark Forest
Shale Gravel Transition Forest	Shale Gravel Transition Forest

* see **Figure 11**

** Critically Endangered Ecological Community

Recorded locations of threatened flora and fauna species and populations are depicted in **Figure 12,** based on a database search of the NSW Wildlife Atlas performed on 7 January 2011 for the Blacktown LGA. The records indicate the following are listed as threatened under the TSC Act:

- 12 flora species
- One flora population
- 29 fauna species

There are also two species listed under the *Fisheries Management Act 1994* (NSW). These species and population are tabulated in **Appendix F.**

Note the high concentration of threatened flora species recorded within the Air Services Australia site, shown in **Figure 12**.

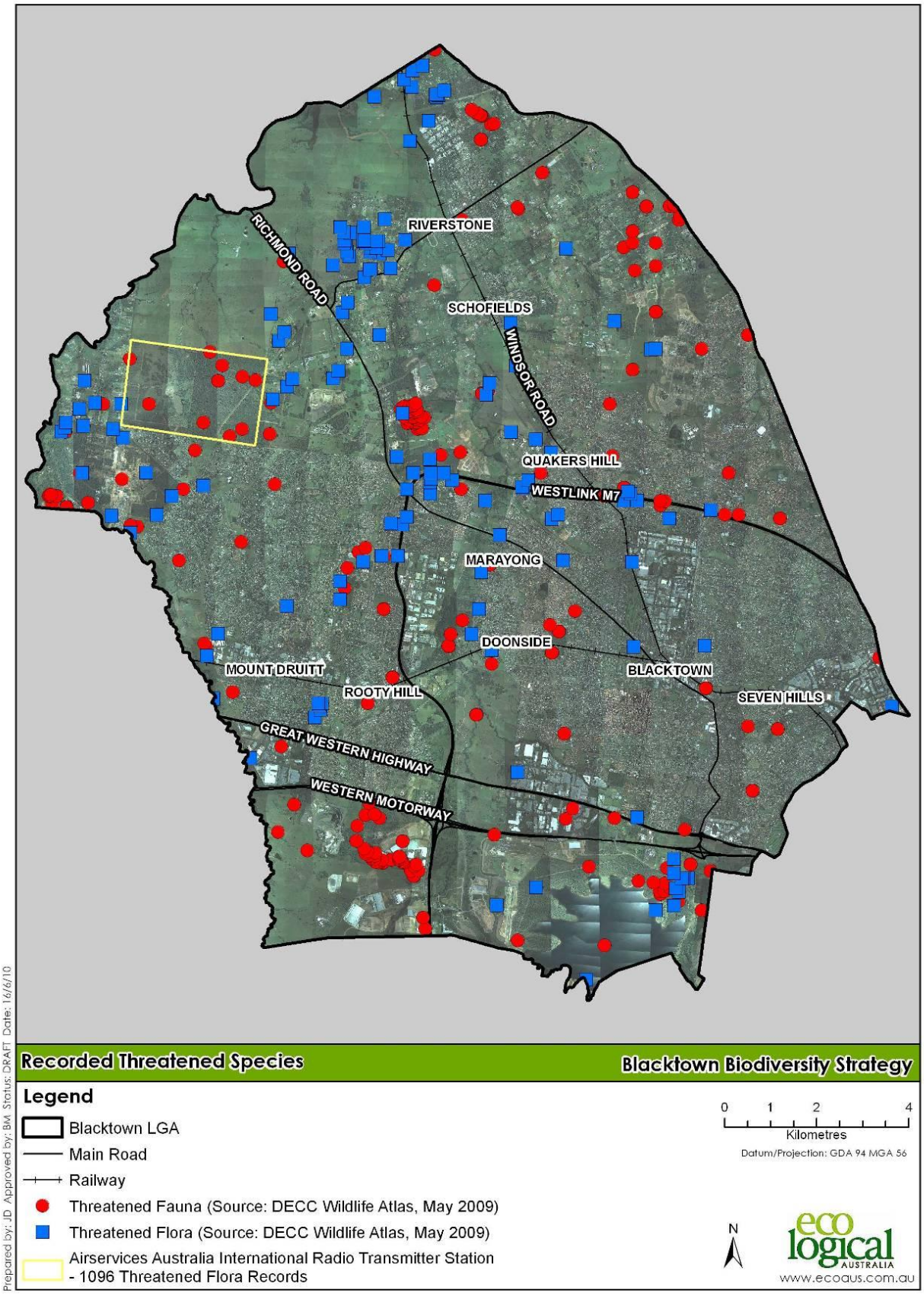


Figure 12: Recorded threatened species

5.4 CONSERVATION SIGNIFICANCE ASSESSMENT

A Conservation Significance Assessment (CSA) was conducted for Blacktown LGA following the updated vegetation mapping (described in **Appendix E**). The CSA process enables a number of habitat values to be evaluated based on consideration of:

- Vegetation community status
- Patch size
- Patch condition
- Adjacency

The end result is a map of conservation priority, as shown in **Figure 13**. Vegetation is classified as Regionally Significant (Core), Support for Core and Other Remnant Vegetation, as follows:

- *Regionally Significant (Core):* These 'Core' areas are the remnants of highest conservation value. They represent areas where species or communities are at imminent risk of extinction, or large areas within the region that constitute the backbone of a viable conservation network across the landscape
- *Support for Core:* These are areas within the region that provide a range of support values including increasing the size of and buffering of areas identified as Regionally Significant (Core). Support for Core areas offer the greatest potential to have their ecological values enhanced by management works and contribution to the ecological and biodiversity values of the region
- *Other Remnant Vegetation:* The remainder of native vegetation has been classified as Other Remnant Vegetation. These areas are mostly smaller, isolated, or poorer quality remnants. Some of the areas classified in this assessment as Other Remnant Vegetation may have local significance

The classification of certain areas of vegetation can change over time. For example, if patch size increases and condition improves as a result of weed control, natural regrowth and revegetation, the classification type may change from Other Remnant Vegetation to Support for Core.

Table 9: Summary of Conservation Significance Assessment (CSA) types in Blacktown LGA

CSA	Total (Ha)	CCM* (Ha)
Core	2438.83	242.7
Support for Core	343.83	34.4
Other Remnant Vegetation	1793.77	121.1
Sum	**4576.43**	**398.2**

*Lands under the care, control or management of Blacktown City Council

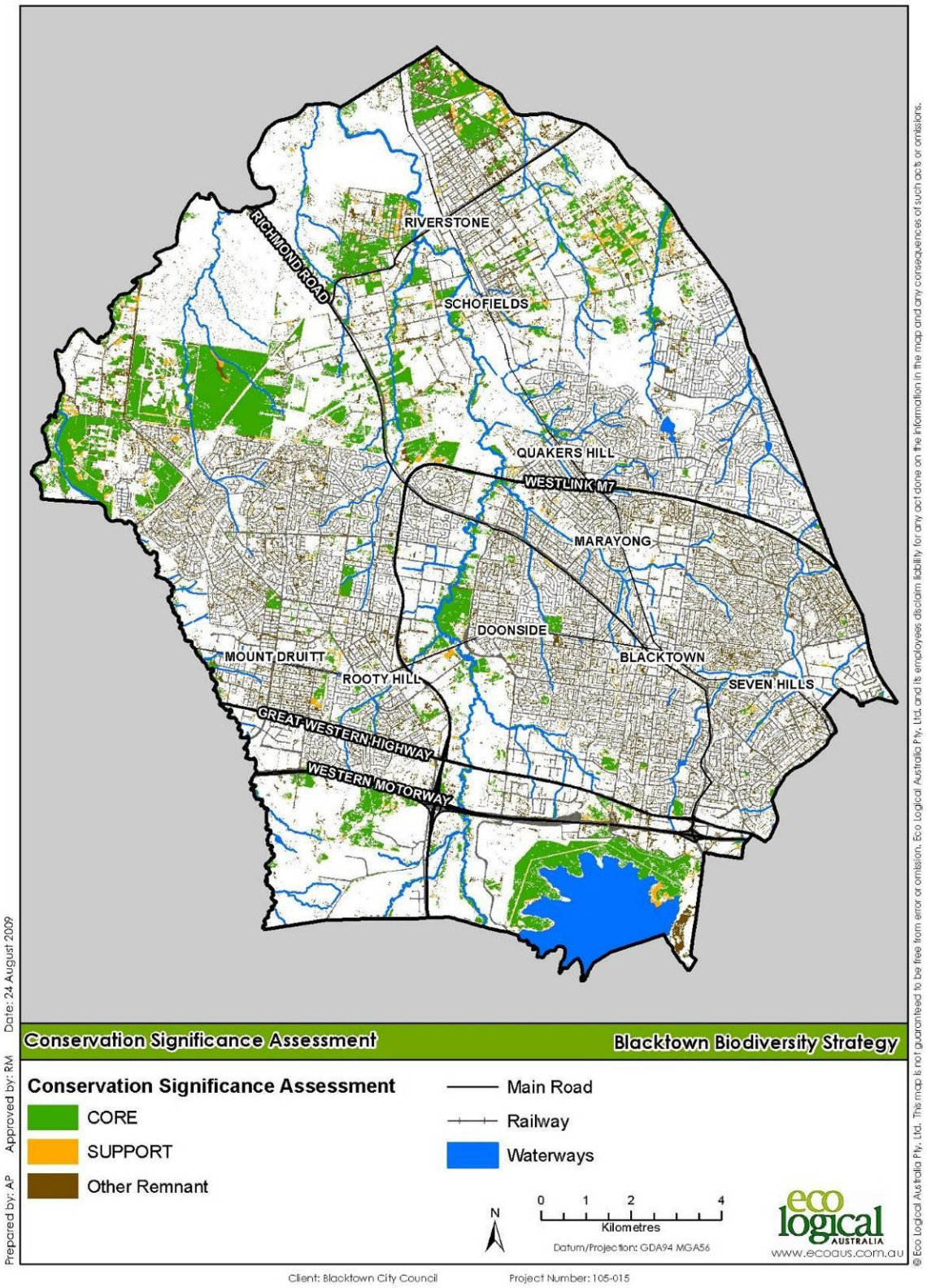


Figure 13: Conservation Significance Assessment

Refer to **Appendix E** for details about the Conservation Significance Assessment.

5.5 ECOLOGICAL CORRIDORS

5.5.1 What are ecological corridors?

Corridors are native linear landscape features that connect larger habitat patches, allowing movement and gene-flow among native flora and fauna. Increased size of habitat areas enhances available resources and allows more ecosystem niches, therefore supporting more species and larger populations.

Corridors may range in structure, from remnant patches of intact vegetation, to standing remnant canopy. Animals often rely upon corridors because they have an obligate relationship with vegetation and cannot move through hostile urban environments. Smaller patches of habitat can link large patches and facilitate movement of more mobile species.

The provision of corridors is a very important component of biodiversity enhancement. Corridors promote opportunities for species movement and long-term viability in an urban bushland setting. There is also more chance of species surviving events such as land clearing, wildfires, fluctuating food supply, changes in birth and death rates, or human-induced habitat changes. If an event causes local extinction or reduction of the population, complete or partial connectivity of patches allows replenishment and re-establishment of the species.

Connections between fragmented habitat areas can also result in the restoration of the diversity that was present in the landscape but which was lost due to the occurrence of small, isolated fragments. The establishment of corridors and the reduced isolation of habitat patches are crucial to successful management of remnant urban bushland in the long-term.

Small remnants of bushland are difficult to manage in an urban landscape, however the effective size of remnants can be increased across the landscape by effectively linking adjacent remnants as an identified corridor. In a sense, the size of the habitat is also related to the amount of bushland exposed at its edges to other land use. This is termed the edge to area ratio, and it is best to minimise this so that there is less edge habitat and more quality, core habitat available for flora and fauna. In addition to consolidation of adjacent remnants, smaller remnants within a nominated corridor can effectively act as stepping stones for the more mobile species such as bats and birds to maintain the overall habitat of a landscape

5.5.2 Design principles for the ecological corridors in Blacktown

- Corridors should be as wide as possible and managed to promote structural and floristic diversity as seen in a natural state. Where possible, the width of existing narrow corridors along creeks and roadways should be increased. Priority should also be given to bushland considered threatened or rare on a regional scale, or bushland that could be secured as habitat for threatened or rare plants and animals
- In urbanised areas such as Blacktown, a workable approach to corridor development that can help overcome situations where wide corridors are not feasible, is to include a primary corridor (which may be narrower than optimum width) surrounded by a secondary corridor
- Proposed corridors should be focussed around waterways and remnant bushland
- Land use and activities within corridors need to be guided by environmental planning instruments, e.g. development control plan
- Consideration of flooding issues
- Where corridors are being rehabilitated, consider the suitability of the location, restrictions on corridor width, and the density and type of planting permitted

5.5.3 Potential corridors within Blacktown

Potential corridor linkage areas within Blacktown LGA have been identified in accordance with the following methodology and are presented in **Figure 14**:

- Plotting known areas of biological significance, such as significant bushland areas (in both public and private ownership), watercourses and wetlands
- Considering the regional context, e.g. linkages to the Western Sydney Parklands regional ecological corridor
- Consideration of the results of the CSA to maximise higher quality habitat to support threatened and other species
- Considering the principles for corridors
- Mapping areas identified as having potential significance as a corridor

The results of this investigation provides a guide to support a network of corridors or linkages that could be established within Blacktown LGA and enhanced by controlling weeds, feral animals and revegetation/regeneration. These corridors could be linked to each other and with other important corridors in neighbouring LGAs. The corridors would provide habitat, food and nesting resources, and movement and dispersal pathways for fauna.

Figure 14 also indicates how the potential corridor network would overlap with the priority conservation lands (PCLs). PCLs have been identified by DECCW to offset vegetation clearance undertaken for the Growth Centres development. PCLs are considered by DECCW to represent the best remaining opportunities in the region to secure long-term biodiversity benefits for the lowest possible cost.

5.5.4 Community support for corridors

Since 2006, the Western Sydney Conservation Alliance Inc has been lobbying for the establishment of an ecological corridor through western Sydney. The proposed 'Cumberland Conservation Corridor' would include and connect the following open space and bushland areas:

- Mulgoa Nature Reserve
- Orchard Hills Defence Establishment
- South Creek and Ropes Creek riparian corridors
- ADI site
- Shanes Park (Air Services Australia)
- Cranebrook
- Castlereagh Nature Reserve
- Agnes Banks Nature Reserve
- Windsor Downs Nature Reserve
- The 'Richmond Woodlands Important Bird Area', designated by Birds Australia

The Federal Government has recently offered to transfer ownership of the 560 ha Shanes Park to the NSW Government. The land would be managed by DECCW as part of the Wianamatta Regional Park.

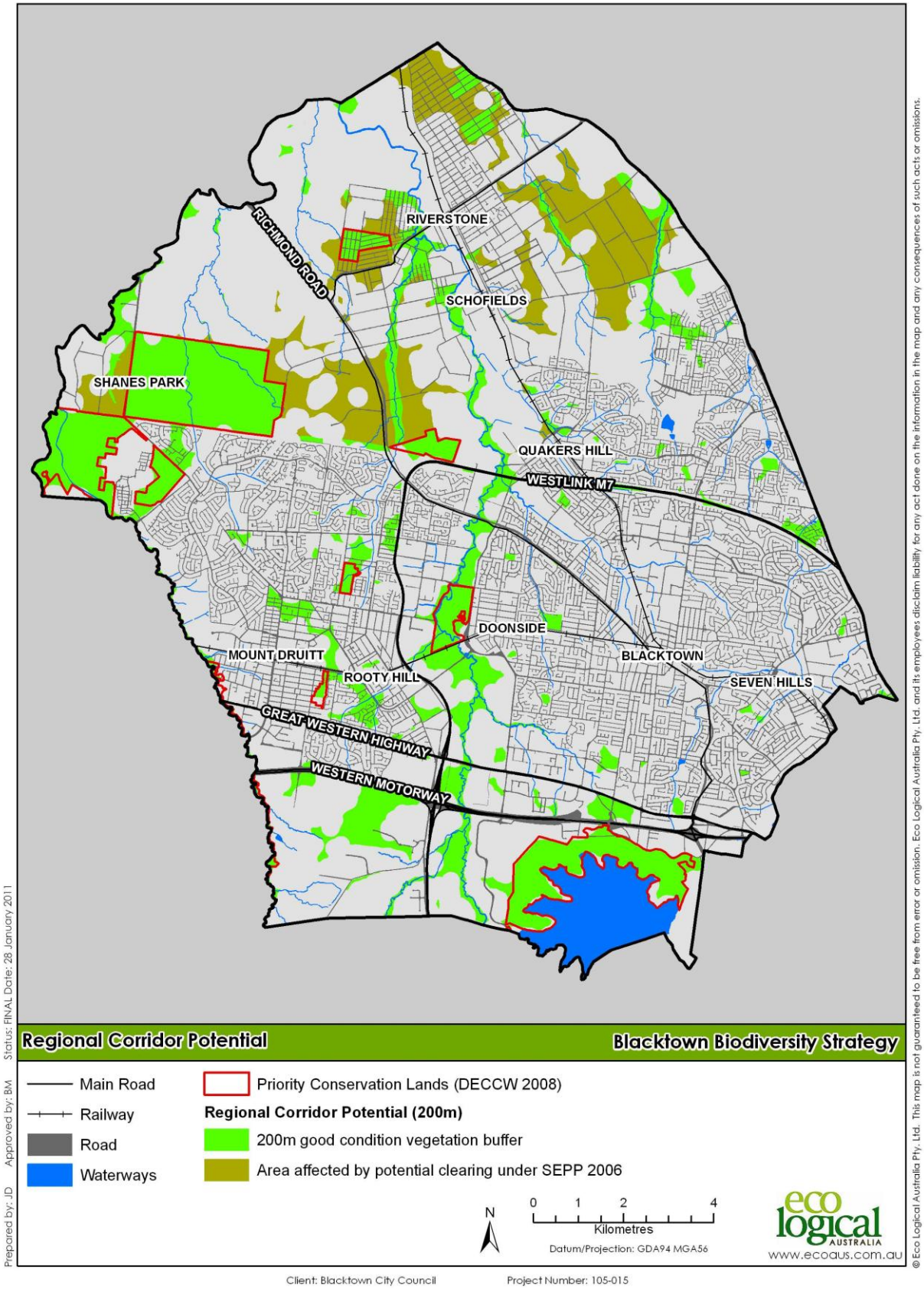


Figure 14: Regional corridor potential and Priority Conservation Lands

5.6 CLIMATE CHANGE & CARBON SEQUESTRATION

5.6.1 Climate change

The following summary is from http://www.environment.nsw.gov.au/climatechange/whatis.htm

Since the Industrial Revolution, human activities, such as using fossil fuels (coal, oil and natural gas) for energy, agriculture and land clearing, have increased the concentration of greenhouse gases in the atmosphere. Since 1750, the amount of carbon dioxide in the atmosphere has risen by 35%, and the current concentration is higher than at any time in the last 650,000 years. The amount of nitrous oxide has risen by 17% and methane has increased by 151%. Since 1900, global average surface temperatures have increased by 0.74^{o}C.

According to NSW Government, CSIRO and Bureau of Meteorology projections, the NSW community needs to prepare for higher temperatures, rising sea levels, less rainfall, more frequent and more severe droughts and more extreme storms. These changes are likely to have significant impacts on agriculture, water supply, settlements and infrastructure, natural resources, biodiversity and human health. The CSIRO and Bureau of Meteorology report, '*State of the Climate'* report outlines some of these changes.

In response to these challenges, there are two clear needs:

- To reduce greenhouse gas emissions to slow the rate of climate change
- To prepare strategies to adapt to inevitable climate change

5.6.2 Carbon sequestration

Carbon sequestration through forestry relies on the natural process of photosynthesis, which effectively captures (or sequesters) carbon dioxide from the atmosphere in the vegetation. Photosynthesis works by combining carbon dioxide together with sunlight in a chemical reaction to produce oxygen and glucose. The carbon remains sequestered in the vegetation until the vegetation is burnt or dies and decomposes, thus releasing carbon back to the atmosphere and soil.

5.6.3 Carbon emissions trading

International frameworks have been established for emissions trading in the context of climate change and global warming. Emissions trading is a regulatory defined market-based mechanism where parties can buy and sell either permits for emissions or credits for emissions reductions to achieve an environmental improvement.

Carbon sequestration is a recognised mechanism for offsetting emissions within trading schemes for greenhouse gases. One form of carbon sequestration is biosequestration - the capture and storage of carbon in plants. These schemes operate within the framework of the Kyoto Protocol to the United Nations Framework Convention on Climate Change, which was adopted in 1997. Australia uses the rules and definitions developed under Kyoto to measure progress towards its 108% emission target[8].

[8] The Australian Government ratification of the Kyoto Protocol came into effect in 2008. Under Kyoto, Australia has committed to limit its greenhouse gas emissions in 2008-2012 to 108% of its emissions in 1990.

NSW State Emissions Trading Scheme

Prior to the development of an Australian National Emissions Trading Scheme, the NSW Government created the Greenhouse Gas Abatement Scheme (GGAS). The GGAS reduces greenhouse gas emissions associated with the production and use of electricity. The GGAS is a standard by which carbon offset projects in NSW, including forestry projects, can be evaluated consistent with the Kyoto Protocol. In terms of forestry, to trade under the GGAS, trees planted to sequester carbon must:

- Be in New South Wales
- Have the capacity to reach at least 2 m in height at maturity and have minimum tree crown cover of 20% of the land mass
- Must be at least 0.2 Ha
- Must be at least 10 m wide
- Must be at least 80% clear of forest on 31 December 1989
- Have a Carbon Sequestration Right (a type of forestry right) registered on the land title
- Have been 'human-induced' through activities like direct seeding or planting
- Be in addition to existing legislative or regulatory requirements
- Must be able to maintain the greenhouse gas abatement for 100 years

National Emissions Trading Scheme

At the time of writing, the Commonwealth Government was developing a National Emissions Trading Scheme referred to as the Carbon Pollution Reduction Scheme (CPRS). The scheme will be designed so that it will link with international markets and schemes, with a preference for open trade.

On 27 April 2010, the Prime Minister announced that the Government has decided to delay the implementation of the CPRS until after the end of the current commitment period of the Kyoto Protocol (end 2012) and only when there is greater clarity on the action of other major economies including the US, China and India.

Voluntary Emissions Trading Schemes

There are also a number of voluntary carbon reduction and offsetting schemes available in the market place under branding such as:

- Greenhouse Friendly (http://www.climatechange.gov.au/greenhousefriendly/) (now defunct)
- Gold Standard (http://www.cdmgoldstandard.org/)
- Climate, Community and Biodiversity (CCB) Standards (http://www.climate-standards.org/index.html)
- Voluntary Carbon Standard (VCS) (http://www.v-c-s.org/index.html)

5.6.4 Council's response to climate change in relation to biodiversity

Blacktown City Council has been proactive in responding to climate change. Over the past few years, Council has established a suite of environmental sustainability and climate change projects. Blacktown has a strong commitment to the environment as a cornerstone of its philosophy and operations, along with social well being and robust economy, for a successful and vibrant City. Environmental sustainability underpins Council's City Vision 2025.

Blacktown City Council has utilised a 'carbon diamond' to think about our programs in relation to climate change. Similar in concept to the waste hierarchy, the diamond shows a hierarchy of actions to mitigate carbon emissions. In order of preference, the programs seek to:

1. AVOID AND REDUCE carbon emissions, through reducing on-site energy consumption, recycling, etc. Examples include Blacktown Solar City, Energy and Water Savings Action Plans, Energy Performance Contract, Cities for Climate Protection™, domestic garbage processing at the UR-3R Alternative Waste Treatment facility, and the Sustainable Living Workshop Series
2. Use ALTERNATIVES, such as renewable energy sources for on-site power consumption. Examples include Blacktown Solar City and design of greener council facilities
3. OFFSET the remaining emissions, usually through planting carbon sinks. Examples include Regenesis

These three stages are shown graphically in the three levels of the carbon diamond below:

Figure 15: Blacktown City Council's Carbon Diamond

Blacktown was the first council in NSW to become a Solar City[9], a Federal Government sponsored program that commenced in 2004. More recently, Council initiated an innovative program called Regenesis to reduce the impact of climate change through collaborative local solutions, including the planting of trees, to capture carbon.

Regenesis provides an effective biodiversity-based carbon sequestration program for local government that empowers the community, government and business to respond to climate change. Regenesis builds on other Council initiatives to provide a tangible and easy way to offset carbon emissions. Through Regenesis, Council intends to utilise the NSW GGAS[10] and the proposed Federal emissions trading scheme to establish a carbon 'pool' yielding long-term income and environmental outcomes for Council.

5.6.5 Carbon Sequestration (Australian Kyoto Protocol) Compliant Land

Figure 16 indicates areas within Blacktown LGA that comply with Australian Kyoto Protocol (AKP) for establishing carbon forests (methodology detailed in **Appendix G**). Identification of AKP land has been carried out as part of a broad strategic assessment to guide where suitable areas for further, more detailed investigation may occur. This broad, strategic identification of land does not consider current or proposed land use and as a result areas may be deemed inappropriate for the establishment of a carbon forest, for example sports fields. Site specific assessment is required to determine the suitability of the AKP-compliant land. Prior to any planting program, the BCC Regenesis Carbon Forest Criteria proforma should be completed on a site by site basis to determine appropriate compliance and suitability.

One of the main criteria of the AKP is that the site must be at least 80% clear of forest on 31 December 1989. **Figure 16** shows land consistent with this criterion based on aerial photography taken in 1990. This data can be used when undertaking site specific assessment for future establishment of carbon forests throughout the Blacktown LGA.

Table 10: Carbon sequestration compliant land

	Blacktown LGA	BCC CCM* Lands
COMPLIANCE CONDITION	Ha (%)	Ha (%)
Compliance with AKP**	9,253 (38%)	912 (<1%)

* Lands under the care, control and management of Blacktown City Council

**Areas >0.2Ha in size; >10 m wide and with no extant vegetation in 1990

[9] http://www.blacktownsolarcity.com.au/

[10] As a condition of funding from the NSW Environmental Trust, Regenesis is required to operate within the NSW Government's current carbon trading framework - GGAS

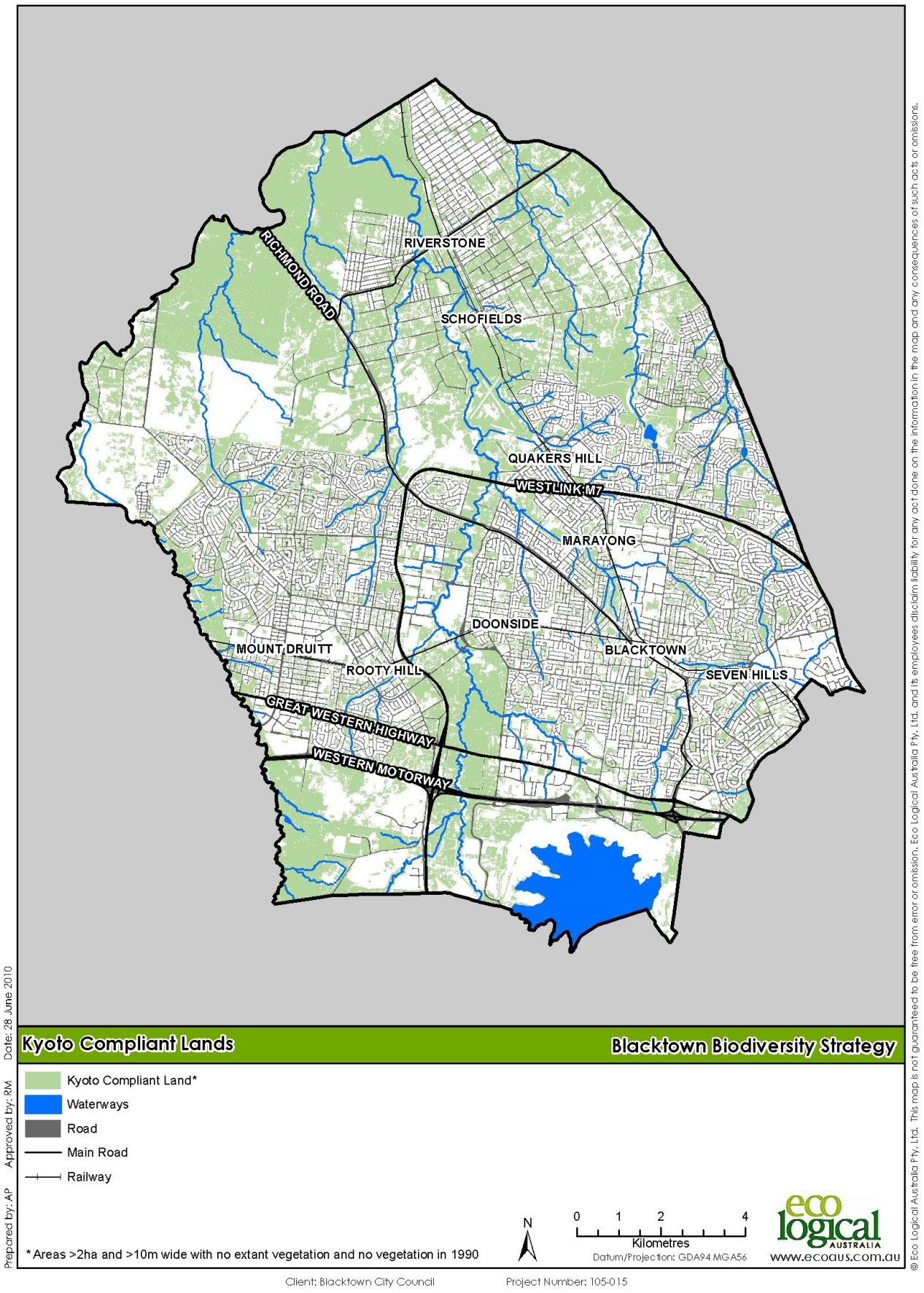


Figure 16: Kyoto compliant lands

5.6.6 Priorities for carbon sequestration

As its highest priority, Regenesis undertakes revegetation to enhance biodiversity and environmental outcomes on a given site. Nevertheless, all Regenesis plantings are also designed to comply with AKP requirements for carbon forests and carbon trading. The aim of Regenesis is not to achieve the highest possible yield of carbon sequestration and carbon certificates and disregard environmental outcomes, but rather the aim is to balance biodiversity and environmental factors with carbon sequestration potential.

Figure 17 prioritises areas within the LGA suitable for future planting for carbon sequestration. Priorities have been allocated based on areas compliant with AKP and higher biodiversity value. The criteria for prioritisation for carbon sequestration are made up of:

- AKP Compliant Areas (refer to **Section 5.6.5**)
- High Biodiversity Value
    - Adjacency to Core or Support for Core CSA ranking
    - Within an identified corridor

The area potentially available for planting within each priority is shown in **Table 11** and **Figure 17**.

Table 11: Priorities for carbon sequestration

PRIORITY	AREA (Ha)	CCM* (Ha)
Very High	548.5	106.7
High	326.0	61.9
Medium	620.3	180.0
Low	3437.1	453.8
Very Low	4321.2	109.9
Total	**9253.1**	**912.3**

*Lands under the care, control and management of Blacktown City Council

5.6.7 Pre-existing AKP plantings

Credits can also be generated from previous plantings that are AKP compliant and planted post-1990. An initial count of known areas planted within the Blacktown LGA is shown in **Table 12**. Records for areas planted within the LGA are currently incomplete and those identified are indicative only and require further refinement and confirmation from Council.

Table 12: Known AKP compliant areas planted since 1990

PLANTINGS	AREA (Ha)
Western Sydney Parkland Plantings - Unknown Date	28.31
BCC areas planted (identified from 1988 air photos)	307.5
Total	**335.81**

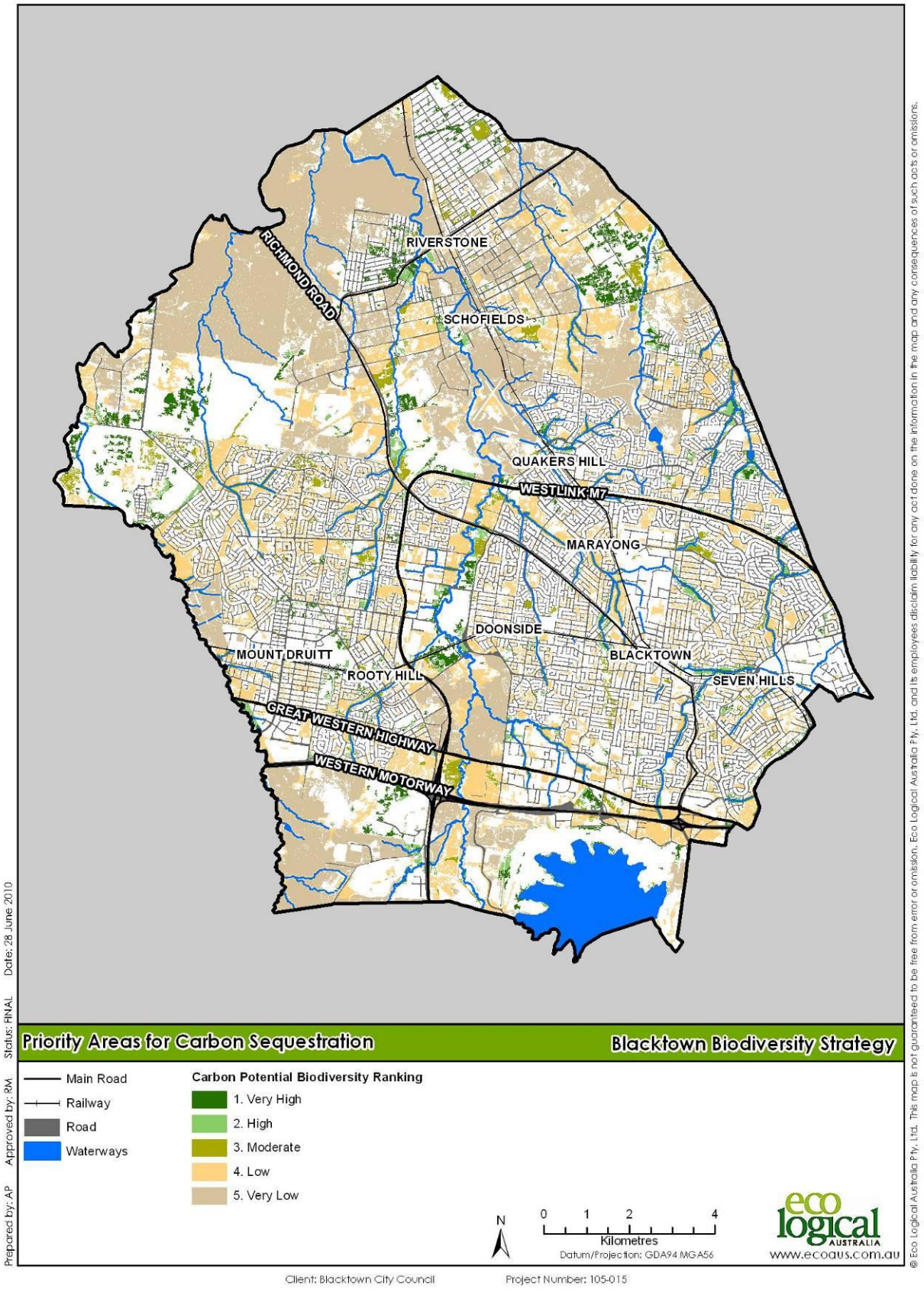


Figure 17: Priority areas for carbon sequestration

5.6.8 BioBanking & Council

BioBanking framework

The NSW Government introduced the Biodiversity Banking and Offsets Scheme (or 'BioBanking') in 2008 to help address the loss of biodiversity values, including threatened species. BioBanking is a voluntary market-based scheme administered by DECCW that provides a streamlined biodiversity assessment process for development, a rigorous and credible biodiversity offsetting scheme, as well as an opportunity for landowners to generate income by managing land for conservation. The framework for the scheme was established under Part 7A of the *Threatened Species Conservation Act 1995* (NSW), and is supported by the *Threatened Species Conservation (Biodiversity Banking) Regulation 2008* (NSW), BioBanking Assessment Methodology and Compliance Assurance Strategy.

BioBanking enables 'biodiversity credits' to be generated by landowners who commit to enhance and protect biodiversity values on their land through a BioBanking agreement. These credits can then be sold, generating funds for the management of the site. Credits can be used to counterbalance (or offset) the impact on biodiversity values that are likely to occur as a result of development. The credits can also be sold to those seeking to invest in conservation outcomes, including philanthropic organisations and government.

The four main key elements of the BioBanking Scheme are:

- Establishing BioBank sites on land through BioBanking agreements between the Minister for Climate Change and the Environment and the landowners
- Creating biodiversity credits for management actions that are carried out, or proposed to be carried out, to improve or maintain biodiversity values on BioBank sites. The BioBanking assessment methodology and its associated Credit Calculator determine the number of biodiversity credits that may be created for these management actions
- The trading of credits, once they are created and registered
- Enabling the credits to be used to offset the impact of development on biodiversity values. The methodology determines the number and class of credits that must be retired to offset the impact of a development and ensure that the development improves or maintains biodiversity values

Council's obligations and opportunities

The *BioBanking Handbook for Local Government* (DECC 2008) and the NSW Planning Circular PS 10-010 (March 2010) describe Council's obligations and opportunities regarding BioBanking. Key points are summarised below:

Local councils play a vital role in BioBanking as development consent authorities. Where a developer chooses to use BioBanking, local councils are legally required to incorporate the conditions of a BioBanking statement (issued by DECCW) into the relevant development consent.

Local councils may be able to establish BioBank sites on their own land and generate biodiversity credits to help manage land for biodiversity. This can assist with the ongoing costs for conservation management of the land.

Local councils will only receive biodiversity credits for performing management actions over and above their existing legal obligations. This is to account for the principles of 'additionality' for offsets. That is, offset activities must be additional to actions or works required by existing legal requirements or carried out using public funds. This includes legislative requirements for certain categories of publicly owned land being managed for conservation.

Council owned or managed lands where a BioBank site could be established include:

- Areas classified as community land (for example, 'natural areas') under the *Local Government Act 1993* (NSW)
- Land under environmental protection zoning
- Crown land managed by local councils on behalf of reserve trusts under *the Crown Lands Act 1989* (NSW)
- Land obtained or dedicated to council through development contributions where the land has not been used as an offset

BioBanking and carbon sequestration

If a BioBank site is created, then there may be certain limitations regarding the use of that same site at a later date for carbon sequestration under proposed carbon trading schemes because of the additionality principle.

A site that has been used to sequester carbon for the purpose of carbon trading may be used at a later date as a BioBank site. However, DECCW may discount the BioBanking credits created to reflect the management obligation of the site as stated under the land management requirements for carbon sequestration.

6 Threats to biodiversity

Threats to biodiversity within the Blacktown LGA reflect the urban and semi-rural nature of the LGA and its proximity to the North West Growth Centre of Sydney.

6.1 KEY THREATENING PROCESSES

The *Threatened Species Conservation Act 1995* (NSW) *(*TSC Act), *Fisheries Management Act 1994 (*NSW) (FM Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) provide for the listing of key threatening processes and the preparation of threat abatement plans. There is considerable overlap in the State and Commonwealth sets of key threatening process.

Under the EBPC Act, a process is defined as a key threatening process if it threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community. Key threatening processes as defined by the TSC Act are the things that threaten, or could threaten, the survival or evolutionary development of species, populations or ecological communities. A process can be listed as a key threatening process if it could:

- Cause a native species or ecological community to become eligible for adding to a threatened list (other than conservation dependent)
- Cause an already listed threatened species or threatened ecological community to become more endangered
- If it adversely affects two or more listed threatened species or threatened ecological communities

Key threatening processes listed under the EPBC Act that may be relevant in the Blacktown LGA include:

- Competition and land degradation by European Rabbits (*Oryctolagus cuniculus)*
- Competition and land degradation by unmanaged Goats (*Capra aegagrus hircus*)
- Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)
- Infection of amphibians with chytrid fungus resulting in chytridiomycosis
- Land clearance
- Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases
- Predation by European Red Fox (*Vulpes vulpes*)
- Predation by feral Cats (*Felis catus)*
- Predation, habitat degradation, competition and disease transmission by feral Pigs
- 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 Fire Ant (*Solenopsis invicta)*

Key threatening processes, listed under the TSC Act and FM Act, that may be relevant in the Blacktown LGA include:

- Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands
- Bushrock removal

- Clearing of native vegetation
- Competition and grazing by the feral European Rabbit
- Competition and habitat degradation by feral Goats
- Competition from feral Honeybees
- Ecological consequences of high frequency fires
- Exotic vines and scramblers
- Feral Pigs
- Herbivory and environmental degradation caused by feral Deer
- Human-caused climate change
- Infection of frogs by amphibian chytrid causing the disease chytridiomycosis
- Infection of native plants by *Phytophthora cinnamomi*
- Invasion and establishment of Scotch Broom (*Cytisus scoparius)*
- Invasion of native plant communities by Bitou Bush (*Chrysanthemoides monilifera* subsp. *rotundata*) and Boneseed (*Chrysanthemoides monilifera subsp. monilifera)*
- Invasion of native plant communities by exotic perennial grasses
- *Lantana camara*
- Loss of hollow-bearing trees
- Predation by feral Cats
- Predation by the European Red Fox
- Predation by the plague minnow (*Gambusia holbrooki*)
- Removal of dead wood and dead trees

In summary, the main threats to biodiversity in Blacktown LGA are land clearing, weeds, feral animals and inappropriate fire regimes. These are described in the following sections.

6.2 LAND CLEARING

Clearing of vegetation poses the greatest threat to biodiversity within the LGA. Vegetation clearing removes flora, destroys habitat and food resources for a wide range of species, not only those that would live permanently in the vegetation but also those that rely on it for food and shelter seasonally or during crisis times. Land clearing also destroys or alters ecological processes relating to or dependent on hydrology and soil composition.

Residential, commercial and industrial property development continues to occur at a rapid rate in the Blacktown LGA.

6.2.1 Clearing in the Growth Centre

As the vegetation communities map (**Figure 11**) shows, much of the extant vegetation within Blacktown LGA is located in the North West Growth Centre. Some of this is designated as reserve (e.g. the Shanes Park Airservices Australia site, which has a high concentration of threatened species records - refer to **Figure 12**)[11]. However, about 4,950 ha are proposed to be cleared for urban development.

[11] Biodiversity conservation should be the primary objective for Shanes Park and this should be reflected in any plan of management or masterplan for the site, even if it becomes part of the broader Wianamatta Regional Park.

Under the conditions of biodiversity certification, clearing of vegetation in the North West Growth Centre must be offset by improvements to biodiversity elsewhere. This process is the responsibility of the NSW Department of Planning.

6.2.2 Clearing elsewhere in the LGA

Patches of vegetation across the remainder of the LGA are mostly in reserves managed by Council or in the ecological corridor of the Western Sydney Parklands. A small proportion of native vegetation in the LGA grows in gardens or as street trees. Further loss of vegetation would be caused by consolidation and expansion of urban areas.

6.3 WEEDS

NSW Industry and Investment classifies weeds into the following groups, depending on their characteristics and impacts, with many weeds belonging to more than one group.

Table 13: Weed classifications

CLASSIFICATION	DESCRIPTION
Noxious weeds	Weeds that are declared noxious are those weeds that have potential to cause harm to the community and individuals, can be controlled by reasonable means and most importantly, have the potential to spread within an area and to other areas. A weed is declared noxious because its control will provide a benefit to the community over and above the cost of implementing control programs. As of July 2010, there are 95 declarations of 'noxious plants' under the *Noxious Weeds Act 1993* within the Blacktown LGA (see **Appendix H** for a list of the species).
Environmental weeds	Environmental weeds are plants that represent a threat to the conservation values of natural ecosystems. They invade native plant communities and out-compete them, causing a reduction in plant diversity and resulting in a loss of habitat for native animals.
Agricultural weeds	Agricultural weeds are plants that represent a threat to agricultural production. They reduce the area available for agricultural activities, interfere with agricultural practices, and affect the quality of produce.
Weeds of National Significance (WONS)	Under the National Weeds Strategy, 20 introduced plants were identified as Weeds of National Significance (WONS). These weeds are regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts.
National Environmental Alert List Weeds	Under the National Weeds Strategy, 28 environmental weeds were identified National Environmental Alert Weeds. Alert Weeds are non-native plant species that are in the early stages of establishment and have the potential to become a significant threat to biodiversity if they are not managed.

Source: http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/definition

Blacktown City Council is one of four constituent councils forming the Hawkesbury River County Council (HRCC). HRCC is a single-purpose council responsible for undertaking noxious weed control on public lands. HRCC is funded in part by the NSW Industry and Investment, and in part by its constituent councils. As such, HRCC is responsible for undertaking noxious weed control and site inspections within the LGA. Blacktown City Council controls environmental weeds and some noxious weeds on public lands.

6.4 FERAL ANIMALS

Feral animals are a threat to biodiversity for one or more of the following reasons:

- They are predators to native species
- They compete with native species for food and habitat
- They destroy or damage native species habitat
- They spread diseases that impact on native species

Feral animals can cause serious economic losses to agricultural production, pose an unacceptable risk of exotic disease, threaten the survival of many native species and cause environmental degradation. Public and private landholders have an obligation under the *Rural Lands Protection Act 1998* (RLP Act) to eradicate feral animals on land they own, occupy or manage. The Livestock Health and Pest Authority identifies the following vertebrate pests as a significant problem under the Rural Lands Protection Act 1998, including Rabbits, Feral Pigs, Wild Dogs, Feral Cats, Goats, Deer and Foxes.

6.5 FIRE REGIMES

Australian flora has evolved to adapt to certain fire regimes which are determined by fire intensity, frequency and season. Changed fire regimes caused by poor management practices, lack of research and knowledge, increased urbanization and arson may have the long-term effect of threatening many flora species and biota which may be dependent on them, resulting in long-term decline in biodiversity.

Council has prepared maps of Bushfire Prone Lands for the LGA (refer to **Figure 18**) in accordance with the *Rural Fire Service Guideline* (NSW Rural Fire Service 2006a). Two categories of bushfire prone vegetation have been identified for the primary purpose of protecting property through identification and implementation of asset protection zones or buffers:

- Category 1 vegetation - applies to forest, woodland, heath and wetland greater than 1 Ha. A 100 m buffer applies to these areas
- Category 2 vegetation - applies to moist rainforest, shrubland, open woodland, mallee and grassland greater than 1 Ha. A 30 m buffer applies to these areas

Detailed bushfire planning for asset protection and sustainable ecosystems should be achieved through development of Plans of Management for reserves within the LGA. The *Bush Fire Environmental Assessment Code for NSW* (NSW Rural Fire Service 2006b) specifies fire thresholds for vegetation communities. For example, Cumberland Plain Woodland should not be burnt more frequently than every seven years and there should be no slashing, trittering or tree removal associated with bushfire hazard reduction.

6.6 ROADS

Roads can present a major barrier to wildlife movement and result in death of fauna attempting to cross. Proposals to construct new large roads and easements through areas of high biodiversity value such as Shanes Park should be avoided because they can significantly impact biodiversity and ecological connectivity.

Where possible, road design for upgrades or new roads should feature land bridges or tunnels to facilitate safe fauna crossing.

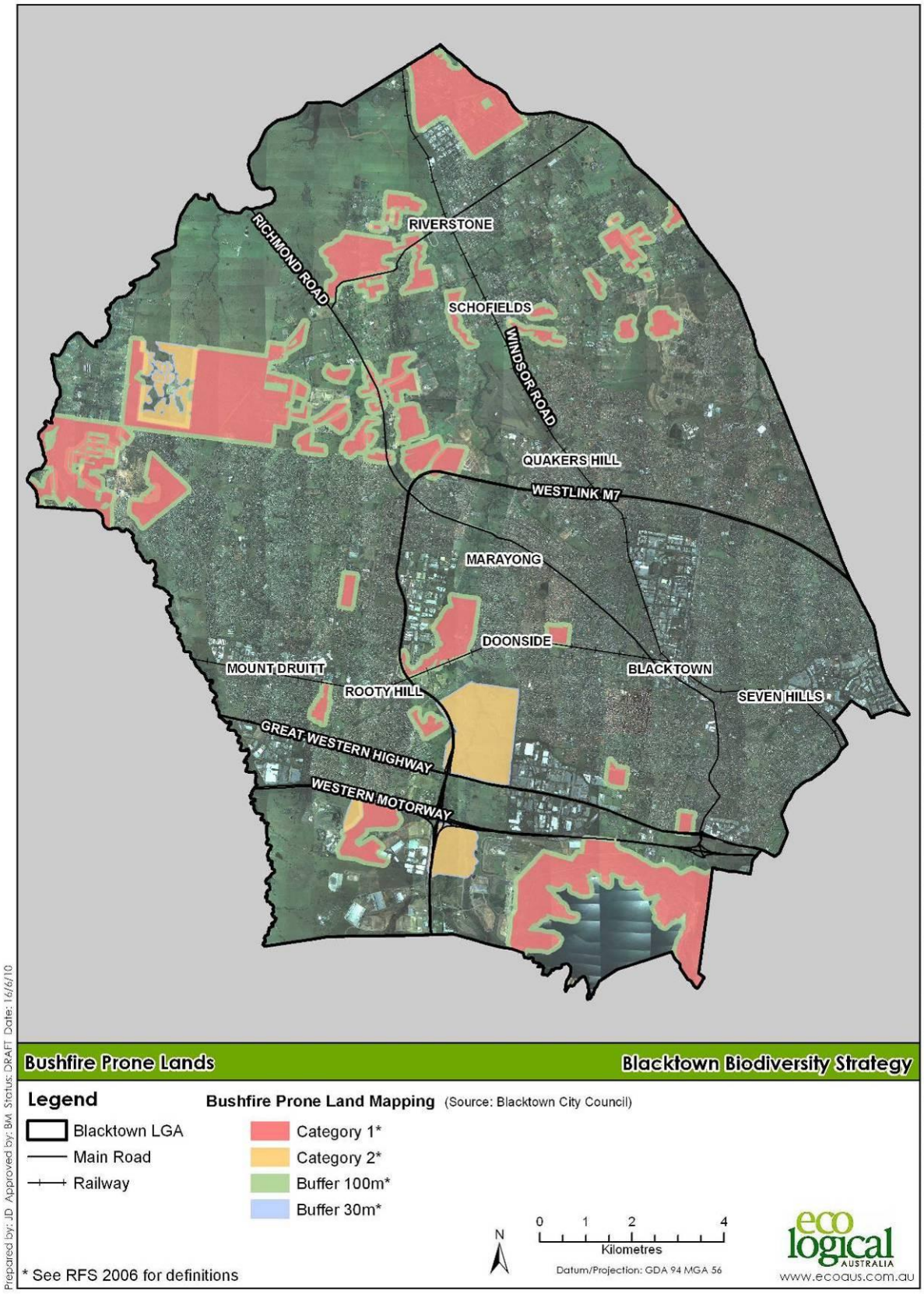


Figure 18: Bushfire Prone Lands

6.7 CLIMATE CHANGE

As outlined in **Section 5.6**, climate change in NSW is predicted to result in higher temperatures, rising sea levels, less rainfall, more frequent and more severe droughts and more extreme storms. Climate change is listed as a key threatening process under the *Threatened Species Conservation Act 1995* (NSW) and the *Environment Protection and Biodiversity Conservation Act 1999* (NSW).

An assessment of the vulnerability of Australia's biodiversity to climate change (Natural Resource Management Ministerial Council 2009) found that biodiversity is at risk from even moderate climate change and is already under stress, for example from habitat degradation, changed fire regimes and invasive species. Among the recommendations of the report:

- Management objectives for the future aimed at maintaining all species in their present locations and ecosystems in their present composition will no longer be appropriate. A management priority must be to maintain the provision of ecosystem services through a diversity of well-functioning ecosystems, some of which may have no present-day equivalent
- A central strategy is giving ecosystems the best possible chance to adapt by enhancing their resilience. Approaches to building resilience include managing appropriate connectivity of fragmented ecosystems, enhancing the National Reserve System, protecting key refugia, implementing more effective control of invasive species, and developing appropriate fire and other disturbance management regimes. In some instances, ecological engineering will need to be considered
- Risk assessments are a key approach to identify especially vulnerable species and ecosystems. Risk spreading conservation strategies, coupled with active adaptive management approaches, are an effective way to deal with an uncertain climatic future
- Reorientation of policy and legislative frameworks, and reform of institutional and governance architecture, are essential. These actions can support novel strategies for biodiversity conservation, such as integrated regional approaches tailored for regional differences in environments, climate change impacts and socio-economic trends
- Even with much more effective policy and management strategies, there is a limit to how much we can enhance the adaptive capacity of natural ecosystems. Without rapid and effective mitigation of climate change, there is a high risk of an accelerating wave of extinctions throughout the 21st century and beyond

6.8 OTHER THREATS

In addition to the key threatening processes, there are a range of other threats to biodiversity which need to be managed. Some of these are listed below:

- Physical damage from recreational activities
- Edge effects (rubbish, fire and weed invasion)
- Water pollution
- Changed hydrology
- Soil and air pollution
- Salinity
- Nutrification
- Erosion and sedimentation
- Drought
- Disease
- Fragmented habitat
- Illegal hunting and gathering

6.9 THREAT ABATEMENT

DECCW has developed the *NSW Threatened Species Priorities Action Statement*[12] (PAS) to recover threatened species and abate key threatening processes. The PAS is based on 34 unique recovery and threat abatement strategies, which have actions listed. These are further categorised into high, medium and low priority actions and, where feasible, assigned to the catchment management area or local government area where they are best placed to occur. DECCW is responsible for working with stakeholders (e.g. council, landowners) to implement the PAS.

Where relevant, this Biodiversity Strategy adopts actions identified in the PAS. Examples of DECCW's priority actions and strategies are given in **Appendix C**.

The *Cumberland Plain Recovery Plan* (DECCW 2010) is an overarching plan that focuses on the threatened species, populations and ecological communities that are endemic to the Cumberland Plain or are primarily distributed on the Cumberland Plain. The Cumberland Plain Recovery Plan takes a multi-pronged approach building on four recovery themes:

- Building the Cumberland Plain protected area network, including both public and private land and concentrating on the identified Priority Conservation Lands (**Figure 14**)
- Delivering best management practices to prevent degradation of remaining bushland
- Enhancing the community's understanding and awareness of the values of the Cumberland Plain
- Improving our understanding of, and capacity to manage, the many threats to the biodiversity of the Cumberland Plain

Relevant actions from the Cumberland Plain Recovery Plan are included in this Strategy.

[12] http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_PAS_new.aspx

Part 3
Strategic Action Plans

7 Strategic actions

Objectives and targets in this Biodiversity Strategy will be achieved through implementation of strategic actions for the Western Sydney Parklands, the North West Growth Centre and the remainder of the LGA. Actions were developed in consultation with stakeholders (described in **Appendix A - Methodology**) and consider the results of a strengths, weaknesses, opportunities and threats analysis (**Appendix B**), and DECCW's priority actions and strategies for Blacktown LGA (**Appendix C**).

Strategic Action Plans are described and tabulated in the following categories:

- Planning, policy and guidelines
- Management and resources
- Communication and education
- On-ground works
- Monitoring

Strategic Action Plans are colour-coded in the tables as follows:

- Strategic Actions for Blacktown City Council are blue
- Strategic Actions for agencies such as the Department of Planning, Department of Environment, Climate Change and Water, NSW Industry and Investment, the Office of Hawkesbury Nepean, and Western Sydney Parklands Trust are orange

7.1 IMPLEMENTATION

Strategic Actions need to be implemented in accordance with Blacktown City Council's *Code of Conduct, Occupational Health and Safety System Policies and Procedures,* and *Purchasing and Procurement Policy.*

Priorities and responsibilities are allocated to each action in the tables to indicate how the actions are to be implemented.

7.1.1 Priority and status

Priorities have been allocated consistent with the Integrated Local Government Planning and Reporting Framework as follows:

- High - to be completed by June 2013
- Medium - to be completed by June 2017
- Low - to be completed by June 2021

The status of each action has been identified as follows:

- New - action not commenced
- Commenced - action initiated, however not finalised
- Completed - action finalised
- Ongoing - continual action required
- N/A - not applicable. Action relates to another agency

7.1.2 Responsibilities

Overall responsibility for implementation of the Strategy will rest with Council, with particular aspects of the implementation resting with the Directorate of Sustainable Living (e.g. education, revegetation), Directorate of City Strategy and Development (e.g. planning), the Directorate of City Assets (e.g. rehabilitation of drainage areas), and the Directorate of Finance and Corporate Strategy (e.g. business technology).

7.2 STRATEGIC ACTIONS FOR PLANNING, POLICIES AND GUIDELINES

Actions relating to planning, policies and guidelines are summarised in **Table 14**. Many of the following statutory and strategic planning recommendations will be subject to broader public consultation, Blacktown City Council's consideration, and information not available or irrelevant to the preparation of this Biodiversity Strategy. The recommended LEP approaches would provide the basis for Council's consideration of ecological issues in preparing future local environmental plans and in assessing development proposals.

Table 14: Strategic actions for planning, policies and guidelines

CODE	ACTION - PLANNING, POLICIES & GUIDELINES	PRIORITY	STATUS	RESPONSIBILITY
Stakeholder Consultation				
P1	That the Biodiversity Strategy form the strategic basis for BCC consultation with the NSW Department of Planning with regard to natural resource management for that area of the LGA	High	Ongoing	Directorate of City Strategy and Development
Local Environmental Plan				
P2	Include the Vision for this Strategy *'To conserve, restore and enhance biological diversity and ecosystem health, particularly threatened species, populations and communities'* as an objective in provision 2a of the new Comprehensive LEP* *(Refer Clause 1.2.2a of the Standard LEP)*	High	Commenced	Directorate of City Strategy and Development
P3	Consider the delineation of E2 - Environmental Conservation Zones for the Comprehensive LEP, having regard for the following criteria: • Existing zoning, with open space zones as primary candidates • Land parcel size (large enough to ensure that lands can be effectively managed) • Potential for connectivity to riparian lands and/or other core or support for core vegetation • Potential for connectivity with E2 zones in neighbouring council areas and on lands zoned under SEPPs • Acquisition priorities • Other development constraints Priority Conservation Lands identified by DECCW (2010) should be included in environment protection and regional open space zones (Action 1.4 of the CPRP)	High	Commenced	Directorate of City Strategy and Development
P4	Consider the inclusion of a biodiversity local provision clause into the Comprehensive LEP. The clause may contain matters for consideration, when assessing development applications for land to which the clause applies.	High	New	Directorate of City Strategy and Development

CODE	ACTION - PLANNING, POLICIES & GUIDELINES	PRIORITY	STATUS	RESPONSIBILITY
P5	Consider the inclusion of a riparian land and waterways local provision clause into the Comprehensive LEP. The clause may contain matters for consideration, when assessing development applications for land to which the clause applies.	Medium	New	Directorate of City Strategy and Development
Development Control Plan				
P6	Include a trees and vegetation section for the forthcoming DCP that includes: • Protection of trees and vegetation which is subject to the Local LEP clauses for Biodiversity (Terrestrial) and Riparian Land and Waterways, having particular regard to trees of high biodiversity value • Information requirements for development consent applications regarding proposed works to or removal of vegetation. This may include a requirement for the provision of a Vegetation Management Plan • Guidance regarding vegetation clearing for the purposes of bushfire management • Planting guidelines that include a preference for species indigenous to the local area	Medium	Commenced	Directorate of City Strategy and Development
Development Assessment				
P7	Establish a procedure to capture all relevant information on Council's computerised data information system to enable Council to meet its legislative responsibilities in providing information on Section 149 Planning Certificates including the following: • Item 2 (f) whether the land includes or comprises critical habitat. Clarification is sought as to what defines critical habitat and how Council becomes aware of these • Item 9A - Biodiversity certified land A statement to the effect that the land is biodiversity certified land • Item 10 - BioBanking agreements A statement to that effect that a BioBanking agreement under Part 7A of the *Threatened Species Conservation Act 1995* (NSW) relates, (but only if the council has been notified of the existence of the agreement by the Director-General of the Department of Environment, Climate Change and Water) • Item 12 - Property vegetation plans A statement to that effect that a vegetation plan under the *Native Vegetation Act 2003* (NSW) applies, (but only if the council has been notified of the existence of the plan by the person or body that approved the plan under that Act) NB. Schedule 1 of the Native Vegetation Act 2003 excludes Blacktown Local Government Area from the operation of the Act	High	Ongoing	Directorate of City Strategy and Development

CODE	ACTION - PLANNING, POLICIES & GUIDELINES	PRIORITY	STATUS	RESPONSIBILITY
	In addition investigate the need or otherwise of supplying additional information on the Section 149(5) Planning Certificate in relation to places under assessment for the Commonwealth Heritage List under the *Environment Protection and Biodiversity Conservation Act 1999*(Cwlth) (e.g. Llandilo International Transmitter Station site)			
P8	In assessing applications under Part 4 and Part 5 of the *Environmental Planning and Assessment Act 1979*, BCC to develop an in-house referral framework for development assessment officers when: • Areas of biodiversity value are proposed to be impacted – Bushcare Coordinator • VMP or offsetting provisions are triggered - Bushcare Coordinator • Riparian Provisions or WSUD proposed - Stormwater Officer	High	New	Directorate of City Strategy and Development Directorate City Assets
P9	Continue with compliance process for new development proposals to ensure compliance with consent conditions	High	Ongoing	Directorate of City Strategy and Development
P10	Continue with auditing process for new development proposals to ensure compliance with consent conditions	High	Ongoing	Directorate of City Strategy and Development
P11	Update and extend the development approval process to ensure biodiversity issues are addressed at all stages of the site based activity and development assessment and approvals process, relative to new mapping undertaken as part of this Biodiversity Strategy	High	New	Directorate of City Strategy and Development
P12	Prepare a set of model conditions for development consents, consistent with new DCP guidelines, to address protection, maintenance and enhancement of biodiversity values, including a list of ecological values that need to be applied to the site by the planner	High	Commenced	Directorate of City Strategy and Development
P13	Prepare a fact sheet providing pre DA advice for 'Biodiversity Development Assessment'	High	Commenced	Directorate of City Strategy and Development
P14	Ensure all requirements of BioBanking Agreements (i.e. vegetation offset plantings) are considered as part of the DA and Tree Application process	High	Ongoing	Directorate of City Assets
Other Council Strategies				
P15	Review the *Blacktown Street Tree Planting Strategy* and consider the following inclusions: • Any plant with a known history as an environmental weed in the Blacktown area, or a significant risk of becoming one, should not be selected for street planting • Ideally, trees will have the capacity to support native fauna such as birds • Species should be long-lived • Consideration should be given to the use of endemic species where possible. However, many endemic species are not suitable as street trees due to their growth habit or space requirements	High	New	Directorate of City Assets Directorate of Sustainable Living
P16	References to BCC's Revegetation & Regeneration Strategy to be amended to refer to BCC's Biodiversity Strategy	Low	New	Directorate of Sustainable Living

CODE	ACTION - PLANNING, POLICIES & GUIDELINES	PRIORITY	STATUS	RESPONSIBILITY
P17	Review BCC's Open Space Maintenance Strategy so that it relates to the Biodiversity Strategy	Medium	New	Directorate of City Assets
P18	Ensure the BCC Integrated Water Cycle Management Strategy and Water Sensitive Urban Design (WSUD) & Development Control Plan Handbook adheres to the principles of the Biodiversity Strategy.	Medium	New	Directorate of City Assets
P19	Develop a Water Strategy for Council for the management of water in the Blacktown LGA, consistent with the principles of the Biodiversity Strategy.	Medium	New	Directorate of City Assets
Plans of Management				
P20	Link development and implementation of Plans of Management (POMs) for Council's reserves (including existing POMs) with the priorities identified in the Biodiversity Strategy eg: Core areas	Medium	Ongoing	Directorate of Sustainable Living
P21	Plans of management need to consider priority actions and key threatening processes, including climate change, identified by DECCW and NSW Industry & Investment for relevant species, populations and communities within the subject area	Medium	Ongoing	Directorate of Sustainable Living
Land Acquisition				
P22	Consider potential land acquisition as it relates to biodiversity value	Medium	Ongoing	Directorate of Finance and Corporate Strategy
Data Management				
P23	Review and update conservation assessment mapping every five years	Medium	Ongoing	Directorate of Sustainable Living
P24	Create and maintain a register of ecological studies conducted in the LGA and their associated data to be used in update of biodiversity values mapping	Medium	Ongoing	Directorate of Sustainable Living
Other Agencies				
P25	Map waterfront lands according to top of bank, stream categories and corridor widths as part of the precinct planning process. Biodiversity within the Growth Centres is being protected primarily by application of the *Water Management Act* (waterfront land controls)	High	N/A	NSW Department of Planning
P26	Liaise with BCC to determine land within the LGA suitable to receive offsets. Loss of biodiversity within the Growth Centres will be offset by improvements elsewhere, mainly outside the Growth Centres. Priority sites have been identified by DECCW and include bushland near Prospect Reservoir and the ADI site	High	N/A	DECCW - Growth Centres Biodiversity Offsets Program
P27	Continue to implement the Western Sydney Parklands *Biodiversity Restoration Strategy*	High	N/A	WSP Trust

*Also consider inclusion in future planning proposals to amend the LEP

7.3 STRATEGIC ACTIONS FOR MANAGEMENT AND RESOURCES

The Biodiversity Strategy builds on the existing management framework by:

- Adopting existing relevant strategies and actions
- Recognising the roles of different players and improving coordination between them
- Filling the data and management gaps e.g. through vegetation mapping, and actions that address biodiversity values and threats

This Strategy requires adequate funds and resources, and improved information management to be successfully implemented. **Table 15** identifies opportunities for funding and resourcing, including in-kind contributions.

Table 15: Strategic actions for management and resources

CODE	ACTION - MANAGEMENT & RESOURCES	PRIORITY	STATUS	RESPONSIBILITY
Staffing				
R1	Coordinate the implementation of the Strategic Action Plans within the Biodiversity Strategy	High	Ongoing	Directorate of Sustainable Living
Funding				
R2	Continue to seek grants and funding from various sources such as the NSW Environmental Trust and Catchment Management Authorities	High	Commenced	Directorate of Sustainable Living
R3	Investigate opportunities to become involved in the Growth Centres Biodiversity Offset Program	High	Ongoing	Directorate of Sustainable Living
R4	Investigate opportunities for BioBanking	High	Commenced	Directorate of Sustainable Living
R5	Develop long-term Asset Management Plans for Council's street tree planting, landscaping, revegetation & regeneration activities	Medium	New	Directorate of City Assets Directorate of Sustainable Living
Non-Council Resources				
R6	Network with adjoining councils and agencies, e.g. CMAs, WSP Trust, to establish and support regional biodiversity programs, e.g. weeds, feral animals, wildlife corridors, water quality in The Hills, Penrith (Ropes Ck), Hawkesbury and Holroyd (Greystanes Ck)	High	Ongoing	Directorate of Sustainable Living

CODE	ACTION - MANAGEMENT & RESOURCES	PRIORITY	STATUS	RESPONSIBILITY
R7	BCC to consider joining the Urban Feral Animal Action Group	High	Commenced	Directorate of Sustainable Living
Data Management				
R8	Prepare and implement a data management plan that facilitates the exchange and use of biodiversity information for all aspects of this Biodiversity Strategy. In developing the data management plan, consider capacity to integrate with related systems, e.g. Western Sydney Parklands database, NSW Wildlife Atlas, Growth Centres Offsets database	Medium	New	Directorate of Finance and Corporate Strategy; Directorate of Sustainable Living
R9	Make Biodiversity Strategy mapping information available to relevant Council staff and make training available to appropriate staff as required	High	Ongoing	Directorate of Finance and Corporate Strategy
R10	GIS mapping products to be regularly updated in accordance with the methods outlined in appendices in this Biodiversity Strategy	High	Ongoing	Directorate of Finance and Corporate Strategy; Directorate of Sustainable Living
R11	Scan and orthorectify appropriate aerial photography (dated 1988) across the LGA to provide base imagery to support GIS analysis of carbon opportunities	High	Commenced	Directorate of Finance and Corporate Strategy; Directorate of Sustainable Living
R12	Include all bushland reserves on Council's Asset Register	High	Ongoing	Directorate of Sustainable Living
R13	Undertake additional ground truthing of Biodiversity Strategy mapping including aquatic weed, rubbish dumping, carbon and vegetation communities, and flora and fauna species and habitats	Medium	Ongoing	Directorate of Sustainable Living Directorate of City Assets
Regenesis				
R14	Facilitate the integration of Regenesis program (including biosequestration planting & maintenance requirements) into BCC's existing operations	High	Commenced	Directorate of Sustainable Living
Other Agencies				
R15	Consider making funds available to acquire land for reserves, establish reserves (e.g. primary weeding, fences) and prepare conservation covenants	High	N/A	DECCW- Growth Centres Biodiversity Offset Program
R16	Continue Greening Western Sydney funding for on-ground works and ecological monitoring as described in the Biodiversity Restoration Strategy. Contracts to be reissued every three years	High	N/A	WSP Trust

7.4 STRATEGIC ACTIONS FOR COMMUNICATION, COMMUNITY ENGAGEMENT AND EDUCATION

Council already offers a number of community education and involvement programs. These programs are broadly consistent with the objectives of ecological sustainability and many can be expanded to incorporate biodiversity issues and management.

Table 16: Strategic actions for communication and education

CODE	ACTION - COMMUNICATION & EDUCATION	PRIORITY	STATUS	RESPONSIBILITY
Council Training				
C1	Coordinate implementation of the Biodiversity Strategy between Council departments, relevant agencies and the community through consultation prior to adoption	High	Ongoing	Directorate of Sustainable Living
C2	Develop an educational training package for BCC staff which includes modules for different sections to raise awareness and educate stakeholders about their responsibilities regarding biodiversity management. For example, the planning approvals section of BCC will need a module which includes information on new biodiversity planning controls, ecological assessments, planning overlays and the referrals process; and construction personnel will need a module on how to deliver works in an environmentally sensitive manner which may include training in plant identification	Medium	New	Directorate of Sustainable Living
C3	Train and provide information where required to planners/engineers about requirements for ecological assessments as part of development approval process	High	New	Directorate of Sustainable Living
C4	Train where required BCC natural resources officers on the management prioritisation of open space areas using a bushland rating tool	High	New	Directorate of Sustainable Living
C5	Train where required BCC field staff on identifying and managing threatened species, populations and communities (including the recent up-listing of Cumberland Plain Woodland to a critically endangered ecological community)	High	New	Directorate of Sustainable Living
C6	Engage fauna experts (e.g. from DECCW or consultants) to train staff in habitat requirements for wildlife (e.g. for bush regenerators and open space planners)	Medium	New	Directorate of Sustainable Living
C7	Train where required BCC staff in the use of the data management system for the Biodiversity Strategy	Medium	New	Directorate of Finance and Corporate Strategy Directorate of Sustainable Living
C8	Inform BCC staff, Councilors, developers and the broader community regarding the planning overlays	High	New	Directorate of City Strategy and Development

CODE	ACTION - COMMUNICATION & EDUCATION	PRIORITY	STATUS	RESPONSIBILITY
C9	Train where required BCC staff in Regenesis revegetation requirements including (i) assessing sites for compliance with carbon trading and (ii) designing revegetation works to ensure maximum carbon sequestration and trading opportunity	High	Commenced	Directorate of Sustainable Living
C10	Train where required BCC staff regarding obligations and opportunities regarding BioBanking	High	Commenced	Directorate of Sustainable Living
Community Education & Engagement				
C11	Commission local social research to understand the community's perceptions/knowledge/appreciation for biodiversity conservation issues and the types of initiatives/messages likely to inspire action/engagement in conservation	Medium	New	Directorate of Sustainable Living
C12	Develop an *Education for Sustainability Strategy*, a community biodiversity education & engagement strategy (similar to the *Stormwater Education Strategy*) that builds on and integrates with other existing environmental education programs. Consistent with Action 3.5 of the CPRP, BCC will continue to work with Aboriginal communities, landowners, community groups, and students to deliver best practice management in the priority conservation lands, and to identify other opportunities for involvement in the Cumberland Plain Recovery Plan. The strategy should:	High	Commenced	Directorate of Sustainable Living
C13	• Explore how to more fully engage with the Aboriginal community and seek their involvement in landscape management	High	Ongoing	Directorate of Sustainable Living
C14	• Investigate opportunities to protect and enhance indigenous connections to environment and biodiversity	High	New	Directorate of Sustainable Living
C15	• Develop a Council sponsorship program enabling local businesses to sponsor Councils Environmental Sustainability events and bushland sites, including Regenesis sites. This could be known as the Blacktown City Council Greenleaf Sponsorship program	High	Commenced	Directorate of Sustainable Living
C16	• Identify and partner with non-government organisations such as the Cumberland Bird Observers Club, Conservation Volunteers Australia, Department of Juvenile Justice, WWF and WIRES for on-ground works and education	Ongoing	Commenced	Directorate of Sustainable Living
C17	• Review existing community education/involvement programs, including data collection, and determine how to make these more effective and relevant to biodiversity management	High	New	Directorate of Sustainable Living
C18	• Identify key biodiversity messages/issues to be conveyed to target audiences such as Bushcare, schools, businesses, residents	High	New	Directorate of Sustainable Living

CODE	ACTION - COMMUNICATION & EDUCATION	PRIORITY	STATUS	RESPONSIBILITY
C19	• Identify more effective methods to retain, recruit & train volunteer Bushcare members. For example, tree planting days have been used successfully to attract and retain Bushcare members	High	Commenced	Directorate of Sustainable Living
C20	• Continue to support Council Volunteer Bushcare program with aim of strengthening and expanding the program	High	Ongoing	Directorate of Sustainable Living
C21	• Investigate new opportunities to introduce residents to environmental issues	High	Ongoing	Directorate of Sustainable Living
C22	• Engage newly arrived residents, with a focus on NESB, in biodiversity conservation programs, e.g. Operation Bluetongue	High	Commenced	Directorate of Sustainable Living
C23	• Conducting educational workshops and hands-on activities to educate/involve the community, and utilise printed materials as secondary support	High	Commenced	Directorate of Sustainable Living
C24	• Engage consultants/volunteer experts to support BCC staff in workshop presentations	High	Ongoing	Directorate of Sustainable Living
C25	• Review/revise/update brochures to reflect specific biodiversity issues in Blacktown LGA	High	New	Directorate of Sustainable Living
C26	• Determine how best to disseminate information to the community	Medium	Commenced	Directorate of Sustainable Living
C27	• Distribute relevant brochures produced by other agencies (e.g. CMAs, DECCW)	Medium	Ongoing	Directorate of Sustainable Living
C28	• Liaise with the Department of Education and local schools to establish/increase 'Biodiversity in Schools' program	Medium	Ongoing	Directorate of Sustainable Living
C29	• Tailor and implement the ‘Local Living’ property-specific biodiversity education program in selected areas	Medium	New	Directorate of Sustainable Living
C30	• Identify and develop demonstration biodiversity conservation gardens to be used for community education, e.g. investigate potential at Grantham Heritage Park	Medium	New	Directorate of Sustainable Living
C31	• Educate residents and visitors about the impacts of feeding native and feral animals and alternatives for attracting wildlife to residential gardens. Undertaken as part of current Sustainable Living Workshops, but could be increased	High	Ongoing	Directorate of Sustainable Living
C32	• Educate residents who neighbor bushland areas on the impacts of and alternatives to dumping garden waste and predation by domestic pets on biodiversity	High	Ongoing	Directorate of Sustainable Living
C33	• Develop public signage relating to biodiversity & environmental management including educational, interpretive and compliance signage	High	Commenced	Directorate of Sustainable Living

CODE	ACTION - COMMUNICATION & EDUCATION	PRIORITY	STATUS	RESPONSIBILITY
C34	• Improve on the delivery of indigenous species through Council's annual plant giveaway	High	Commenced	Directorate of Sustainable Living
C35	• Maintain the number of indigenous species given away to residents as part of the annual plant giveaway	High	Ongoing	Directorate of Sustainable Living
C36	• Update Council's website to include current biodiversity information including how community can assist in biodiversity	High	Commenced	Directorate of Sustainable Living
C37	• Introduce awards program for community and businesses who actively participate and contribute to Council's Environmental Sustainability programs	High	New	Directorate of Sustainable Living
C38	• Assist community and businesses in applying to non-Council awards programs to recognise contribution by local Blacktown community	High	Ongoing	Directorate of Sustainable Living
C39	• Notify adjacent residents of onsite works and, if deemed appropriate, invite them to participate in ongoing care of the site through Council's Volunteer Bushcare Program	High	Ongoing	Directorate of Sustainable Living
C40	• Develop interactive programs for key local reserves that contain examples of the threatened biodiversity identified in the CPRP (Action 3.7 of the CPRP)	High	New	Directorate of Sustainable Living
C41	Future consultation regarding the Biodiversity Strategy should be in line with Council's *Community Engagement Strategy*	High	New	Directorate of Sustainable Living
C42	Liaise with agencies such as the Catchment Management Authority and NSW Industry and Investment regarding actions and education programs that may affect waterways	High	Ongoing	Directorate of Sustainable Living Directorate of City Assets
Other Agencies				
C43	Meet regularly with Council representatives to discuss impacts on biodiversity and offsetting opportunities	High	N/A	NSW Department of Planning and DECCW- Growth Centres Biodiversity Offset Program
C44	Develop a community education & involvement program for the Parklands	High	N/A	WSP Trust
C45	In Action 3.4 of the CPRP, DECCW proposes to work collaboratively with local government authorities and other organizations to inform communities about the value and role of remnant vegetation on the Cumberland Plain, the best practice standards for its management, and any opportunities to participate in the recovery program	Ongoing	N/A	DECCW

7.5 STRATEGIC ACTIONS FOR ON-GROUND WORKS

On-ground works include:

- Primary weed control
- Revegetation
- Bush regeneration
- Fencing
- Ecological burns
- Rubbish removal
- Construction and maintenance of stormwater pollution control devices, including water sensitive urban design features such as constructed wetlands and roadside vegetated swales

Priorities for implementation and the specific works to be undertaken at each site will need to be determined through detailed site assessment of values and threats, and consideration of biodiversity management and carbon sequestration objectives. Actions tabulated below include a process for determining priorities for on-ground works and preparing or updating plans of management for reserves within the LGA to guide implementation of on-ground works.

Actions associated with on-ground works are tabulated below. Actions from the Revegetation/Regeneration Strategy have been incorporated in the Biodiversity Strategy.

Table 17: Strategic actions for on-ground works

CODE	ACTION - ON-GROUND WORKS	PRIORITY	STATUS	RESPONSIBILITY
O1	Develop and apply the decision support tool to prioritise and identify requirements for on-ground works. The tool is outlined in **Appendix K**	Medium	Ongoing	Directorate of Sustainable Living
O2	Implement on ground works in accordance with current 'Industry Best Practice' such as DECC 2005 and DIPNR 2003. According to Action 2.5 of the CPRP, DECCW (2010) requires Council to manage to best practice standards (defined in Appendix 2 of the CPRP) any lands which are under their ownership or for which they have care, control and management, which: • Contain any of the threatened biodiversity listed in Table 1 of the CPRP • Are located within the Priority Conservation Lands or, if located outside these lands, have conservation as a primary management objective	Medium	Ongoing	Directorate of Sustainable Living

CODE	ACTION - ON-GROUND WORKS	PRIORITY	STATUS	RESPONSIBILITY
O3	Continue to plant biodiversity based carbon sequestration plantings that are compliant with carbon trading requirements as a part of an ongoing Regenesis program	Medium	Ongoing	Directorate of Sustainable Living
O4	Develop and implement threat abatement programs (e.g. threats from noxious weeds & pest animals). Develop framework to prioritise threat abatement activities and sites in consultation with the CMAs, DECCW, NSW I&I, Weeds Committee, landowners, etc. This needs to be integrated with the broader on-ground works prioritisation framework in **Appendix K**	High	Ongoing	Directorate of Sustainable Living
O5	Prepare a panel of preferred contractors for all aspects of landscape and bushland management works	High	New	Directorate of Sustainable Living
O6	Organise and host community tree planting days, including National Tree Day	High	Ongoing	Directorate of Sustainable Living
O7	Organise and host corporate tree planting days, possibly through ongoing Regenesis program	High	Ongoing	Directorate of Sustainable Living
O8	Organise and host school tree planting days, possibly through ongoing Regenesis program	High	Ongoing	Directorate of Sustainable Living
O9	Establish a native plant Seedbank. Consider Grantham Heritage park as a potential location	High	Commenced	Directorate of Sustainable Living
O10	Expand the BCC nursery to meet the requirements of community plant giveaways and Council's planting activities (including Regenesis).	Medium	New	Directorate of Sustainable Living
O11	Undertake BCC staff planting activities to educate, improve staff morale, improve biodiversity and reduce carbon footprint	Medium	Ongoing	Directorate of Sustainable Living
O12	Investigate opportunities to utilise suitable native grass species on low-traffic recreation areas/grassed areas adjacent to bushland reserves as an alternative to introduced/invasive grasses	Medium	Commenced	Directorate of Sustainable Living
O13	Investigate opportunities to reduce fertilisers/pesticides used in the maintenance of public open space to support soil biota	Medium	New	Directorate of City Assets
O14	Identify opportunities to protect, maintain and restore natural flow regimes, aquatic connectivity and the lifecycle and movement of aquatic organisms along watercourses	High	Ongoing	Directorate of City Assets
O15	Maintain integrated water cycle management measures (eg: bioretention basins) in a manner that is sensitive to the biodiversity values of the site	High	Ongoing	Directorate of City Assets
O16	Continue to implement Council's Environmental Stormwater Management Program	High	Ongoing	Directorate of City Assets

CODE	ACTION - ON-GROUND WORKS	PRIORITY	STATUS	RESPONSIBILITY
O17	Manage fire thresholds to within recommended tolerances in bushfire management plans	High	Ongoing	Directorate of Sustainable Living
O18	Coordinate removal of aquatic weeds in consultation with Hawkesbury County Council, Office of Hawkesbury Nepean, Industry & Investment, and the CMAs	High	Ongoing	Directorate of Sustainable Living Directorate of City Assets
O19	Coordinate the activities of Bushcare, revegetation and Regenesis	Medium	Ongoing	Directorate of Sustainable Living
O20	Coordinate bushfire hazard reduction works as per bushfire management plans	Medium	Ongoing	Directorate of Sustainable Living
O21	Consider the fencing off of key remnant areas in a strategic manner to reduce the creation of informal tracks, exclude feral animals, trail bikes, and encroachment	Medium	New	Directorate of Sustainable Living
O22	Establish 'no-mow/conservation zones' on Council land that have potential to enhance natural and habitat values and encourage natural regeneration. Identify no-mow zones in Plans of Management	Medium	Ongoing	Directorate of Sustainable Living
O23	Implement on ground actions as determined by developed Plans of Management, as resources allow	Medium	Ongoing	Directorate of Sustainable Living Directorate of City Assets
O24	Determine specific 'Vegetation Management Zones' for each remnant area, with priority on Core areas, to ensure ongoing conservation	Medium	Ongoing	Directorate of Sustainable Living
O25	Maintain a database to record on ground works completed as part Council's Bushcare program such as volunteer numbers, hours contributed, number of volunteer groups	Medium	Ongoing	Directorate of Sustainable Living
O26	Incorporate this database in Council's GIS and make available to relevant Council staff	Medium	New	Directorate of Finance and Corporate Strategy
Other Agencies				
O27	On-ground works to fulfill BioBanking obligations	Ongoing	N/A	DECCW- Growth Centres Biodiversity Offset Program
O28	Enhance priority areas within the Parklands by on-ground works (e.g. revegetation) and threat abatement (e.g. noxious weed removal)	Ongoing	N/A	WSP Trust

7.6 STRATEGIC ACTIONS FOR MONITORING AND REPORTING

This section outlines the Monitoring, Evaluation and Reporting framework and builds on the framework presented in BCC's *Revegetation and Regeneration Strategy*. An adaptive management approach is recommended for implementation of this Strategy. As results of monitoring become available, management actions may need to be adjusted in response. Management practices also need to respond to new management techniques, technology or information.

Table 18: Strategic actions for monitoring and reporting

CODE	ACTION - MONITORING	PRIORITY	STATUS	RESPONSIBILITY
M1	Develop a monitoring and reporting program that will indicate progress towards targets in the Biodiversity Strategy and specific targets at the operational planning level, e.g. in plans of management	High	New	Directorate of Sustainable Living
M2	Identify and develop key monitoring indicators which could include e.g. carbon, areas of vegetation lost/gained through development, fauna, climate change impacts, vegetation cover and condition, flora and fauna species	High	New	Directorate of Sustainable Living
M3	Incorporate biodiversity monitoring of the riparian zone into any waterways assessments conducted	High	Ongoing	Directorate of City Assets
M4	Monitor changes in legislation, policy and information relevant to biodiversity and climate change, and share knowledge with relevant staff. Sources of information regarding climate change include the CSIRO, DECCW and UWS	High	Ongoing	Directorate of City Strategy and Development Directorate of Sustainable Living
M5	Request and review results, for information purposes, of ecological monitoring conducted in the Western Sydney Parklands on behalf of the Western Sydney Parklands Trust	Medium	New	Directorate of Sustainable Living
M6	Monitor and report on impacts of climate change on biodiversity and investigate research partnerships to facilitate this with agencies such as CSIRO, DECCW and UWS	High	Ongoing	Directorate of Sustainable Living
M7	Align schedules for monitoring and reporting with the Local Government Integrated Reporting framework. This includes annual reports for BCC's Operational Plan and State of the Environment Report, plus reports in August 2013 (for reporting on the delivery of high priority actions), 2017 (medium priority), 2021 (low priority)	High	Ongoing	Directorate of Sustainable Living
M8	Review Biodiversity Strategy and report relevant implementation; August 2013, 2017 and 2021	High	Ongoing	Directorate of Sustainable Living
M9	Review of the Biodiversity Strategy and associated mapping to be informed by progress on actions and results of monitoring	High	Ongoing	Directorate of Sustainable Living

CODE	ACTION - MONITORING	PRIORITY	STATUS	RESPONSIBILITY
M10	Prepare standard guidelines for flora and fauna assessments to ensure consistency in monitoring	High	New	Directorate of Sustainable Living
M11	Establish and maintain a register/inventory of all species recorded as part of the flora and fauna assessments including data provided by the community e.g. Cumberland Bird Observers Club.	High	Ongoing	Directorate of Sustainable Living
M12	Incorporate this inventory in Council's GIS and make available to relevant council staff	High	Ongoing	Directorate of Finance and Corporate Strategy Directorate of Sustainable Living
M13	Develop a 'Bushfire History' register for Blacktown LGA and link to hazard reduction programs and associated monitoring and reporting.	High	Ongoing	Directorate of Sustainable Living
M14	Incorporate this Bushfire History register in Council's GIS and make available to relevant council staff	High	Ongoing	Directorate of Finance and Corporate Strategy Directorate of Sustainable Living
M15	Develop or adopt existing 'Ecosystem Indicators' to measure targets of this Biodiversity Strategy	High	New	Directorate of Sustainable Living
M16	Review Council's existing bushland management requirements in light of current staffing levels and make recommendations to enable improvement to Councils current bushland management	High	New	Directorate of Sustainable Living
M17	Consider impact on existing resources when (i) designing new works (e.g. revegetation and wetland construction), or (ii) modifying or retiring existing works	High	Ongoing	Directorate of Sustainable Living Directorate of City Assets
M18	Continue to consult with Council's maintenance staff during planning stages of on-ground works	High	Ongoing	Directorate of Sustainable Living Directorate of City Assets
Other Agencies				
M19	Monitoring to fulfill BioBanking obligations	High	N/A	DECCW- Growth Centres Biodiversity Offset Program
M20	Continue to monitor the ecological corridor through the Western Sydney Parklands	High	N/A	WSP Trust
M21	Share results with other relevant parties, e.g. BCC, CMAs and the community	High	N/A	WSP Trust
M22	DECCW will work collaboratively with local councils to enhance the compliance and enforcement program with regard to the unauthorized clearing of bushland on the Cumberland Plain (Action 4.4 of the CPRP)	Ongoing	N/A	DECCW

Part 4
Technical Appendices & Methodology

Appendix A: Methodology

Tasks undertaken during preparation of this Strategy are outlined below. The methodology builds on existing environmental programs, policies and guidelines for Blacktown LGA. Gaps in existing data and information were identified and addressed. A vision, objectives, targets and action plans were developed based on literature review, targeted field investigation and a modified conservation significance assessment.

CONSULTATION

A number of Council officers and government agency representatives were consulted during preparation of the Strategy to obtain relevant information, refine the vision, objectives and targets, develop actions, and generate support for the Strategy to facilitate its effective implementation. A list of stakeholders involved in preparation of the Strategy and the consultation schedule are provided below:

DATE	PURPOSE	PARTICIPANTS* (BCC unless noted otherwise)
March 2009	Inception meeting & obtain data/info	Matthew O'Connor, Regenesis Project Leader Win MinSWE, GIS Administrator
May 2009	Review scope & data audit	Matthew O'Connor, Regenesis Project Leader
July 2009	BCC review of Initial Strategy Document (pre Draft Strategy)	Rachel Agyare, Team Leader Strategic Sue Galt, Team Leader Planning Policy Kate Valentine, Team Leader Environmental Services Nina Baurhenn, Senior Environmental Officer Justine Clarke, Bushcare Coordinator Helen Burnie, Regenesis Project Officer Matthew O'Connor, Regenesis Project Leader
August 2009	Workshops to identify and refine the vision, objectives, targets and actions	**Planning & Property Workshop** John Smith, Coordinator Property Services Katrina Parker, Property Acquisition Officer Jasmina Skoric, Strategic Planner

DATE	PURPOSE	PARTICIPANTS* (BCC unless noted otherwise)
		Rachel Agyare, Team Leader Strategic Justine Clarke, Bushcare Coordinator Natalie Payne, Waterways Rehabilitation Officer Helen Burnie, Regenesis Project Officer Matthew O'Connor, Regenesis Project Leader **Env. Sustainability/Biodiversity/Landscape & Aquatic Workshop** Anne Sacco, Landscape Architect Donna Rattenbury, Environmental Education Strategy Officer Helen Burnie, Regenesis Project Officer Justine Clarke, Bushcare Coordinator Carolyn Adamcewicz, Parks Technical Officer Kate Valentine, Team Leader Env.Services Nina Baurhenn, Environmental & Health Projects Officer Natalie Payne, Waterways Rehabilitation Officer Matthew O'Connor, Regenesis Project Leader
August 2009	Consult non-Council stakeholders to determine relevant information and actions	Western Sydney Parklands Trust, Jim Killen NSW Department of Planning, Paula Tomkins SMCMA, Robin Anderson, Lesley Diver HNCMA, Trish Densmore
August 2009	Consult BCC officers to identify revegetation works within LGA since 1990 (carbon back-counting)	Glenn White, Operation Coordinator Open Space Eddie Rogers, Manager Open Space Tony Napoli, Manager Asset Design Services John Molteno, Senior Engineer Design - Drainage Justine Clarke, Bushcare Coordinator Kim Johnson, Coordinator Landscape Construction

DATE	PURPOSE	PARTICIPANTS* (BCC unless noted otherwise)
		Natalie Payne, Waterways Rehabilitation Officer Robert Brown, Senior Engineer Planning & Support Robert Hage, Supervisor Open Space - Central Mathew O'Connor, Regenesis Project Leader
September 2009	BCC review of Draft Strategy	Alwyn Phillips, Coordinator Land Information Anne Sacco, Landscape Architect Chris Shannon, Manager Strategic & Precinct Planning Donna Rattenbury, Environmental Education Strategy Officer Helen Burnie, Regenesis Project Officer Jasmina Skoric, Strategic Planner John Smith, Coordinator Property Services Justine Clarke, Bushcare Coordinator Kate Valentine, Team Leader Environmental Services Katrina Parker, Property Acquisition Officer Natalie Payne, Waterways Rehabilitation Officer Nina Baurhenn, Senior Environmental Officer Rachel Agyare, Team Leader Strategic Win Min Swe, GIS Administrator Matthew O'Connor, Regenesis Project Leader
November 2009	Consult Regenesis team regarding carbon requirements and associated mapping	Helen Burnie, Regenesis Project Officer Matthew O'Connor, Regenesis Project Leader
November 2009	Consult BCC planners regarding planning requirements & Strategy	Matthew O'Connor, Regenesis Project Leader Helen Burnie, Regenesis Project Officer Jasmina Skoric, Strategic Planner Kylie Odwyer, Strategic Planner Sue Galt, Team Leader Planning Policy

DATE	PURPOSE	PARTICIPANTS* (BCC unless noted otherwise)
		Judith Portelli, Senior Planner Subdivisions Rachel Agyare, Team Leader Strategic
November 2009	Consult BCC planners regarding planning requirements (LEP & DCP) & Strategy	Chris Shannon, Manager Strategic & Precinct Planning Jasmina Skoric, Strategic Planner Judith Portelli, Senior Planner Subdivisions Kylie Odwyer, Strategic Planner Matthew Cooper, Town Planner Rachel Agyare, Team Leader Strategic Sue Galt, Team Leader Planning Policy Trevor Taylor, Manager Development Policy & Regulation Matthew O'Connor, Regenesis Project Leader
January 2010	Consult BCC Land Information regarding data sets	Alwyn Phillips, Coordinator Land Information Win Min Swe, GIS Administrator Matthew O'Connor, Regenesis Project Leader
March 2010	Draft Strategy review by BCC	Matthew O'Connor, Regenesis Project Leader
May 2010	Draft Strategy review by BCC	Rachel Agyare, Team Leader Strategic Jasmina Skoric, Strategic Planner Matthew O'Connor, Regenesis Project Leader
May 2010	Strategy review (Carbon Mapping) by External Peer Review	Ben Keogh, Australian Carbon Traders Pty Ltd
June 2010	Strategy review by BCC (including presentation to BCC by ELA)	Carolyn Adamcewicz, Parks Technical Officer Helen Burnie, Regenesis Project Officer Liz Jeremy, Director, Sustainable Living Vanessa Parkes, Manager Environmental Sustainability Matthew O'Connor, Regenesis Project Leader Natalie Payne , Waterways Rehabilitation Officer

DATE	PURPOSE	PARTICIPANTS* (BCC unless noted otherwise)
		Judith Portelli, Senior Planner Subdivisions Kevin Turner, Team Leader Environmental Health Kate Valentine, Team Leader Environmental Services
July 2010	Strategy review by BCC	Alwyn Phillips, Coordinator Land Information Anne Sacco, Landscape Architect Carolyn Adamcewicz, Parks Technical Officer Chris Shannon, Manager Strategic & Precinct Planning Donna Rattenbury, Environmental Education Strategy Officer Eddie Rogers, Manager Open Space Glenn White, Operation Coordinator Open Space Helen Burnie, Regenesis Project Officer Jasmina Skoric, Strategic Planner John Molteno, Senior Engineer Design - Drainage John Smith, Coordinator Property Services Judith Portelli, Senior Planner Subdivisions Kate Valentine, Team Leader Environmental Services Katrina Parker, Property Acquisition Officer Kevin Turner, Team Leader Environmental Health Kim Johnson, Coordinator Landscape Construction Kylie Odwyer, Strategic Planner Liz Jeremy, Director, Sustainable Living Matthew O'Connor, Regenesis Project Leader Natalie Payne , Waterways Rehabilitation Officer Nina Baurhenn, Senior Environmental Officer Rachel Agyare, Team Leader Strategic Robert Brown, Senior Engineer Planning & Support

DATE	PURPOSE	PARTICIPANTS* (BCC unless noted otherwise)
		Robert Hage, Parks & gardens Supervisor Stephen Donovan, Manager Sports & Recreation Services Sue Galt, Team Leader Planning Policy Tony Napoli, Manager Asset Design Services Trevor Taylor, Manager Development Policy & Regulation Vanessa Parkes, Manager Environmental Sustainability Win Min Swe, GIS Administrator
January 2011	Discuss comments received following Public Exhibition of the Strategy	Matthew O'Connor, Regenesis Project Leader Wayne Olling, Western Sydney Conservation Alliance Geoff Brown, Western Sydney Conservation Alliance Ian Johnson, Cumberland Bird Observers Club Mark Fuller, Cumberland Bird Observers Club Edwin Vella, Cumberland Bird Observers Club

*In addition to consultant team

INFORMATION AND DATA AUDIT

An information and data audit was conducted to identify the best available information on biodiversity values and current management practices within the study area. The review is provided as **Appendix J** and considered:

- Council's biodiversity and environmental management policies and programs
- Council's open space and bushland management, operations and maintenance processes
- Council's environmental programs and sustainability initiatives in relation to Biodiversity Strategy objectives
- Current Commonwealth and NSW Government planning, biodiversity management, policy and legislation
- Relevant spatial data held by Council and NSW Government agencies

In consultation with Council, it was decided that this Biodiversity Strategy would refer to and build on most of the existing management practices, policies, plans, strategies and actions directly relevant to biodiversity management in the LGA. The exception is Council's *Bushland Regeneration and Revegetation Strategy;* its content has been incorporated and expanded in this Biodiversity Strategy.

Results of the information and data audit are incorporated throughout this Biodiversity Strategy.

MAPPING

Comprehensive mapped products have been developed or refined to support the Biodiversity Strategy. This mapping includes carbon opportunity mapping, refined vegetation mapping, biodiversity significance mapping, and aquatic weeds and rubbish mapping.

A suite of criteria was developed to guide the production of each refined mapping product that utilises existing as well as new spatial information for the Blacktown LGA. The mapping methodology and results are discussed in **Appendices C-E.** The key criteria for each of the main mapping products are summarised below.

Carbon

Identification of potential for carbon sequestration has been developed in line with the Kyoto Protocols, including the identification of areas already planted and able to contribute to carbon sequestration targets.

Key elements of the criteria address:

- Lands cleared prior to 1990
- Identification of lands planted/revegetated post 1989
- Vegetation type and carbon sequestration opportunity
- Land surface (impervious and pervious surfaces)
- Land use and planning framework
- Biodiversity and habitat opportunity
- Landscape connectivity

Vegetation and biodiversity significance

Key elements of the criteria address:

- Refinement of extant vegetation
- Biodiversity value - existing (known) and potential, habitat condition, riparian values
- Landscape connectivity - local and regional corridors, distance from nearest habitat
- Future viability - local and regional, habitat patch size
- Priority - legislative framework

Aquatic weeds and rubbish

The key elements of the criteria and methods for identification of areas with potential for presence of aquatic weeds and rubbish include:

- Known areas of aquatic weeds and rubbish dumping
- Severity of known weed and dumping
- Potential pollution/rubbish sources - stormwater and adjacent land uses, zoning
- Public and private access and transport that may facilitate weeds and dumping

FIELD VALIDATION

Field assessment was targeted to areas that are most likely to be affected by the Strategy. More than 10% of the areas identified for carbon sequestration potential were 'field validated' and map data was adjusted accordingly. The field validation was conducted by two ecologists in August 2009 and June 2010.

A process for validation of the extant vegetation community mapping was carried out which covered over 19% of the identified extant vegetation. Previous field validation site data visited by NSW NPWS, AMBS and Eco Logical Australia were collated and incorporated into the assessment. These areas were supplemented by additional opportunistic validation carried out in June 2010.

Over 30 sites were also visually assessed to validate potential rubbish and aquatic weed hotspots in June 2010.

IDENTIFY VALUES AND THREATS

Results of the literature review, field investigation and mapping were used to describe the current status of biodiversity in Blacktown LGA (refer to **Section 5 -** Biodiversity Values) and connectivity with the wider region. Existing and predicted threats to biodiversity were identified (e.g. weeds, climate change). The conservation significance of mapped vegetation was ranked.

DEFINE VISION, OBJECTIVES AND TARGETS

A vision, objectives and targets for biodiversity management and conservation were developed with reference to the broader targets for NSW and the catchments. The vision, objectives and targets are consistent with Council's existing strategies, and are provided in **Section 2**.

IDENTIFY ACTIONS

Strategic Actions that will enable the vision, objectives and targets to be met were assigned to relevant stakeholders, with priorities and timing allocated. The actions:

- Are derived from the SWOT (strengths, weaknesses, opportunities and threats) analysis (**Appendix B**), existing plans of management for reserves, and relevant strategies and programs
- Are spatially defined where possible
- Aim to fill important knowledge gaps
- Are linked to DECCW's Priority Action Statements (**Appendix C**)
- Allow for adaptive management and monitoring

The actions were categorised according to the following**:**

- Planning, policies and guidelines
- Management and resources
- Communication and education
- On-ground works
- Monitoring

Appendix B: SWOT analysis

The following analysis focuses on:

- Strengths and weaknesses of Blacktown City Council's current biodiversity management framework
- Opportunities to improve biodiversity management
- Possible threats to a new management framework
- Actions for the Biodiversity Strategy that build on the opportunities while minimising threats

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS	ACTIONS FOR BIODIVERSITY STRATEGY
Planning, policies & guidelines	Commonwealth and NSW frameworks for biodiversity management are comprehensive and widely used	Complexity of statutory and policy requirements	Identify relevant requirements	Weak treatment of cumulative impacts	Biodiversity Strategy to identify guidelines, policies, etc. that are directly applicable to biodiversity management in Blacktown LGA
		Ongoing revision and updates to listings and advice, e.g. TSC Act Scientific Committee Determinations			Biodiversity Strategy to identify the mechanism for managing changing planning context, e.g. responsibility for monitoring revisions and updates, and sharing that knowledge
	Existing BCC strategies that directly relate to biodiversity management include regeneration and revegetation strategy, open space management strategy, street tree planting strategy		Review existing strategies and identify need to update to be consistent with the Biodiversity Strategy or incorporate in the Biodiversity Strategy		Regeneration and Revegetation Strategy to be superseded by Biodiversity Strategy; other strategies to be updated/revised to ensure consistency with the Biodiversity Strategy

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS	ACTIONS FOR BIODIVERSITY STRATEGY
	BCC's policies and guidelines that indirectly relate to biodiversity management, e.g. programs for sustainable use of energy and water				Revise existing policies and guidelines to ensure consistency with Biodiversity Strategy
	BCC's plan of management for various reserves	Some reserves do not have plans of management	All reserves to have a plan of management	Lack of resources/budget	Biodiversity Strategy to provide the framework to identify and prioritise reserves that require a plan of management
			Work with NSW Department of Planning regarding North West Growth Centre	Inadequate data sharing or poor coordination of rezoning	Biodiversity Strategy to identify responsibilities for management of biodiversity within Growth Centre land and identify mechanisms to offsets biodiversity losses
Management & resources	BCC's organisational structure is clearly defined	Different aspects of biodiversity management are the responsibility of different groups within BCC, e.g. new land release planning, riparian rehabilitation	Define responsibility for implementation of the Biodiversity Strategy and improve coordination of delivery	Lack of awareness about the Biodiversity Strategy and relevant responsibilities/protocols	Biodiversity Strategy to clearly identify BCC directorate responsibilities
	Good working relationships with relevant government agencies, businesses, residents, etc.	Overlap with other agencies' responsibilities, e.g. RFS, Sydney Water, DECCW, CMA	Identify key agencies to coordinate biodiversity management actions	Lack of commitment from agencies or individuals to biodiversity management	Biodiversity Strategy to clearly identify agencies' responsibilities; Biodiversity Strategy to recommend a coordinator be appointed with representatives from BCC and agencies identified
		Different land tenures and zonings for areas within ecological corridors			Biodiversity Strategy to recommend further investigation of land tenure and zoning for areas within the corridors

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS	ACTIONS FOR BIODIVERSITY STRATEGY
			Any organisational change needs to redefine responsibilities for biodiversity management	Changes to BCC's or agencies' structure	Biodiversity Strategy to recommend that the Biodiversity Strategy coordinator require BCC & agency representatives to notify if there is a change in responsibilities
			Robust systems and reporting are needed	Personnel changes & loss of corporate knowledge	Biodiversity Strategy to recommend development of schedules and requirements for regular monitoring, map updates and progress reports; record keeping to be integrated with BCC's broader systems
			A Biodiversity Strategy will provide leverage to obtain additional funds, e.g. Commonwealth and NSW Government grants		Biodiversity Strategy to identify possible funding sources
Communication & education	Many promotional/educational environmental programs exist, e.g. Water for Life, Sustainable Living Workshops, Eco-active Schools, Environmental Expo, Clean-up Australia Day	Many existing environmental programs do not focus on biodiversity issues	Build on existing programs and relationships with the community	Staff responsible for delivery of biodiversity education may not have adequate training/expertise	Biodiversity Strategy to recommend existing programs be reviewed and expanded to cover biodiversity issues and management
		Despite the number of environmental programs, participation rates (as a proportion of LGA population) are relatively low (based on anecdotal evidence)	Increase community participation in environmental programs; improve environmental outcomes through community education and involvement		Biodiversity Strategy to recommend actions regarding community environmental programs

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS	ACTIONS FOR BIODIVERSITY STRATEGY
			Effective communication about biodiversity management will generate greater involvement and support for action	Poor communication may be counter-productive, i.e. biodiversity is perceived as a problem or hurdle	Biodiversity Strategy to recommend a biodiversity communications strategy targeting different groups, e.g. residents, developers, business
On-ground works	Existing Bushcare groups		Increase number of groups and participants	Poor coordination, burn-out of volunteers, maintaining motivation	Biodiversity Strategy to identify priority areas to expand Bushcare operations and suggestions for motivating and retaining volunteers
	Council plant nursery	Maintain adequate supply of suitable local provenance seeds and tubestock	Expand the nursery	Financial risk, ability to satisfy supply contracts	Biodiversity Strategy to recommend a stocktake of viable seed and tubestock (species and quantities) (may have been done under Regenesis); Biodiversity Strategy to determine needs for future on-ground works, e.g. plantings
		Sufficient trained staff to manage/perform on-ground works			Biodiversity Strategy to recommend that BCC review staff levels in light of requirements for future on-ground works, including planting, aquatic weed management and rubbish removal
		Delay and possible lack of flexibility in using contractors because of tendering/contractual requirements	Prepare list of preferred contractors		Biodiversity Strategy to recommend that BCC prepare a list of preferred contractors
			Expand in-kind contributions and investment from business and residents, e.g. tree planting days, offsetting		Biodiversity Strategy to recommend performance indicators be linked with education and promotional activities in (proposed) communications strategy

	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS	ACTIONS FOR BIODIVERSITY STRATEGY
Monitoring	Different organisations conduct environmental monitoring, e.g. BCC, Western Sydney Parklands Trust, Sydney Water, CMA, general community, e.g. Birds in Backyards surveys	Lack of coordination and consistent methodologies, poor and inconsistent record-keeping, lack of good data to inform decision-making	Improve monitoring and adaptive management		Biodiversity Strategy to recommend improved coordination through the (proposed) database management system and decision support tool
		Lack of historical data on a range of indicators to use as a basis for analysing trends over time			Biodiversity Strategy to conduct targeted gap analysis and collate relevant baseline data; suggest methods for ongoing monitoring and mapping
		Old vegetation and conservation significance assessment (CSA) data and broad carbon mapping			Biodiversity Strategy to refine carbon mapping using updated vegetation and CSA data and mapping; identify opportunities for biosequestration
		Limited information regarding aquatic weeds and rubbish in waterways			Biodiversity Strategy to develop process to prioritise hotspots for aquatic weeds and rubbish

Appendix C: DECCW's priority actions & strategies

Under the *Threatened Species Conservation Act 1995*, implementation of priority actions and strategies is primarily the responsibility of all public land managers such as DECCW and BCC.

DECCW identifies 134 priority actions to help recover threatened species and tackle threatening processes in the Blacktown City Council LGA[13]. Of the 134 priority actions in this region, 133 are focused mainly on the recovery of threatened species, populations and ecological communities. These can be grouped into seventeen recovery strategies, as summarised in the table below.

Specific priority actions need to be incorporated, where relevant, into Council's operational level plans such as plans of management for individual reserves. For example, BCC has endorsed actions in the Cumberland Plain Recovery Plan (DECCW 2010) and the *Pimelea spicata* Recovery Plan[14], and is committed to implementing actions from these plans over the next five years.

CATEGORY	NO. OF ACTIONS	EXAMPLE OF ACTION*	
Assess threats and determine recovery strategies	1 action	*Pimelea curviflora* var. *curviflora*	Prepare and implement site specific management plans for high priority sites (Medium priority)
Community and landholder liaison/ awareness and/or education	23 actions	*Lathamus discolor*	Reduce the incidence of Swift Parrot collisions by raising community awareness of the threat of man-made hazards (including windows/glass panes and high wire-mesh fences) in the vicinity of suitable habitat (Medium priority)
Coordinate the recovery and/or threat abatement program	1 action	*Petaurus australis*	Co-ordinate the implementation of the actions outlined in the recovery plan (High priority)
Develop and implement protocols and guidelines	4 actions	Cumberland Plain Woodland	Local Govt prepare plans of management in accordance with the Local Government Act for reserves containing EECs, which have conservation as a primary objective, or where conservation is compatible (High priority)

13 http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/pas_lga_region.aspx?name=Blacktown+City+Council

14 www.environment.gov.au/biodiversity/threatened/publications/pubs/p-spicata.pdf

CATEGORY	NO. OF ACTIONS	EXAMPLE OF ACTION*	
Habitat management (Feral Control, Fire, Ongoing EIA - Advice to consent and planning authorities, Other, Site Protection (e.g. Fencing), Water, Weed Control)	48 actions	*Syconycteris australis*	Develop burning strategies that reduce impacts on preferred habitat in known foraging areas (Low priority)
Habitat Protection (including Voluntary Conservation Agreement/ Joint Management Agreement/ critical habitat nomination, etc.)	13 actions	*Dillwynia tenuifolia*	Identify priority sites on private land, to encourage the preparation of site management plans and the implementation of appropriate threat abatement measures, such as weed and animal control and fire management (Medium priority)
Habitat Rehabilitation/Restoration and/or Regeneration	6 actions	*Myotis macropus (formally Myotis adversus)*	Encourage recovery of natural hydrological regimes, including retention and rehabilitation of riparian vegetation (Medium priority)
Monitoring	9 actions	*Ninox strenua*	Monitor and report on effectiveness of concurrence and licence conditions previously applied to reduce impacts of development on Powerful Owls and their habitats, by recording conditions, picking case studies and checking owl presence post development (Medium priority)
Research	12 actions	*Falsistrellus tasmaniensis*	Undertake long-term monitoring of populations cross tenure in conjunction with other bat species to document changes (Low priority)
Survey/Mapping and Habitat assessment	13 actions	*Marsdenia viridiflora subsp. viridiflora - endangered population*	Re-survey those known sites where little information is available (Medium priority)
Other Action	2 actions	*Dillwynia tenuifolia*	Threat management Ensure plans of management for National Parks, community lands and other public lands include appropriate actions for species' protection, such as weed and animal control and fire management (Medium priority)

*Randomly selected

There is one threat abatement strategy identified for the LGA (refer below).

CATEGORY	PRIORITY ACTION
Establish management agreements with public authorities CMAs and land managers/owners	Prepare environment assessment advice for Local Government regarding activities that may result in human induced dispersal of Gambusia (Medium priority)

Appendix D: Aquatic weeds & rubbish mapping

Introduction

This document firstly outlines the methods which were used to broadly identify and map at a strategic level priority areas susceptible to aquatic weeds and rubbish. This broad brush methodology and scale was restricted by available data and its attributes.

The document then identifies a set of criteria recommended to prioritise future data collection and creation in order to develop more refined and specific information and promote ongoing management for aquatic weeds and rubbish.

The data to be collected for mapping areas susceptible to aquatic weeds and rubbish generally includes:

1. Known areas and severity of weed and rubbish dumping
2. Potential pollution/rubbish sources
3. Public and private access
4. Treatment information

Although the study area is focused on Blacktown City Council it should be noted that issues such as aquatic weeds are regional in scale and cross LGA boundaries.

Broad-brush methods

A set of broad-brush methods comprise the first step in identifying hotspots and potential contamination sources for Blacktown LGA based on readily available data and general assumptions about rubbish dumping and aquatic weed dispersal.

Potential pollution and aquatic weed hotspots

Potential pollution and aquatic weed hotspots were identified based on proximity to community land, open space and waterway/road intersections. The following table outlines the criteria behind the pollution potential rating.

Table D1: Pollution and Aquatic Weed Potential Rating Criteria

Potential Pollution and Aquatic Weed Occurrence Rating	Within 50m of a road/waterway intersection	Adjacent to Community Land	Adjacent to Open Space
Highest	✔	✔	✔
Very High	✔	✔	.
Very High	✔	.	✔
Very High	.	✔	✔
High	✔	.	.
Moderate	.	✔	.
Moderate	.	.	✔
Low	.	.	.

Mapping of BCC State of the Waterways Management Plan 2005

As part of the BCC State of the Waterways Management Plan 2005, waterways within the Blacktown LGA were assessed between June and August 2004. This included the analysis of 399 individual sites in the field. This assessment was undertaken by scoring five waterway attributes of Community, Geomorphology, Disturbance, Riparian Vegetation and In-stream Habitat for each site. Each of the five waterway attributes were scored based on a number of determining attributes. All scores were combined to give each reach an overall rating.

Broad-brush results

Potential rubbish and aquatic weed hotspots and field validation

An analysis was carried out using the potential pollution and aquatic weed criteria defined in **Section 2** above. A number of areas which were considered potential hotspots for rubbish and aquatic weeds (coloured red and purple - highest ratings) were identified throughout the LGA, shown in **Figure D1**. These hotspot areas were identified through a desktop analysis using data available from Council (zoning, community land, roads and waterways) as defined in **Table D1** above.

A limited validation process including a visual assessment for the actual occurrence of pollution or aquatic weeds over 55% of the waterways has been carried out as part of this process (**Figure D2**), however a comprehensive assessment of the waterways which provides information to validate the hotspots information has previously been carried out by Council as part of the Blacktown City Council Creek assessment database carried out in 2004. At present the survey sites documented in the database for this study are only linked to the drainage line name rather than the coordinate location of the sample site, so in order to effectively use the point located sampled data as part of this process, there is a need to spatially reference the sample site locations.

The resulting distribution of potential for the occurrence of pollution and/or aquatic weeds within the waterways in the Blacktown LGA is shown in **Figure D1** and the associated length and percentage of waterway by potential is reported in **Table D2**.

Table D2: Pollution Potential Rating Criteria

Potential Rubbish and Aquatic Weed Occurrence Rating	Approximate Length of Waterway (km)	Percent of all waterways	Length of Waterways in CCM Lands* (km)	Percentage of all waterways
Highest	6.72	1.31%	6.62	1.29%
Very High	60.68	11.84%	53.78	10.49%
High	28.02	5.47%	4.99	0.97%
Moderate	53.65	10.46%	42.58	8.31%
Low	363.54	70.92%	32.73	6.38%
Total	512.61	100.00%	140.70	27.44%

* Lands under care, control or management of Blacktown City Council

An initial comparison can be made with available spatially referenced information from the State of the Waterways project (BCC 2005) describing overall waterway condition (**Figure D3**), which has some consistencies with worst condition waterways and occurrence of hotspot areas. However, the criterion for waterway condition is a combination of a number of other factors, such as bed and bank condition, which are not addressed as part of this assessment.

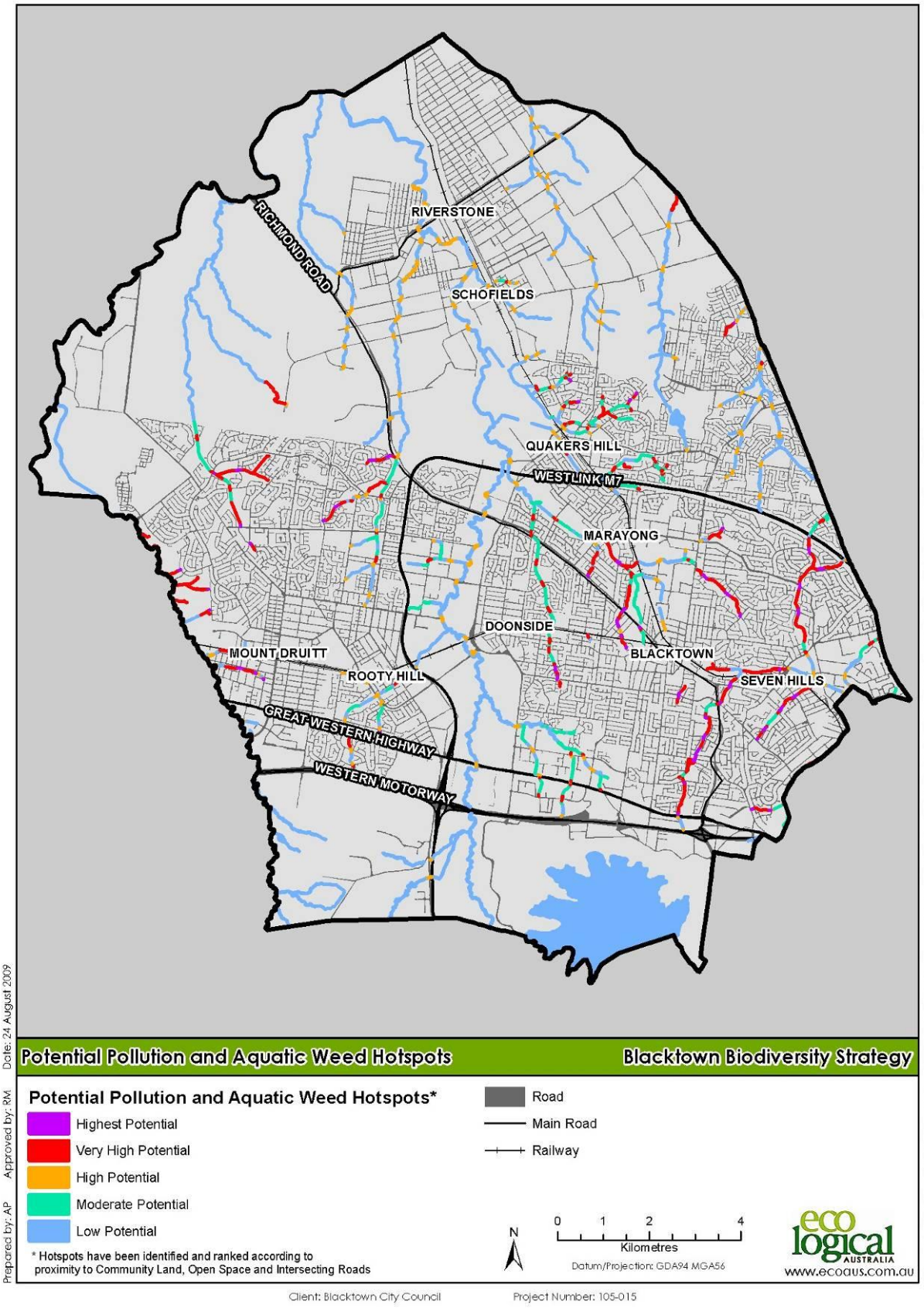


Figure D1: Potential pollution and aquatic weed hotspots

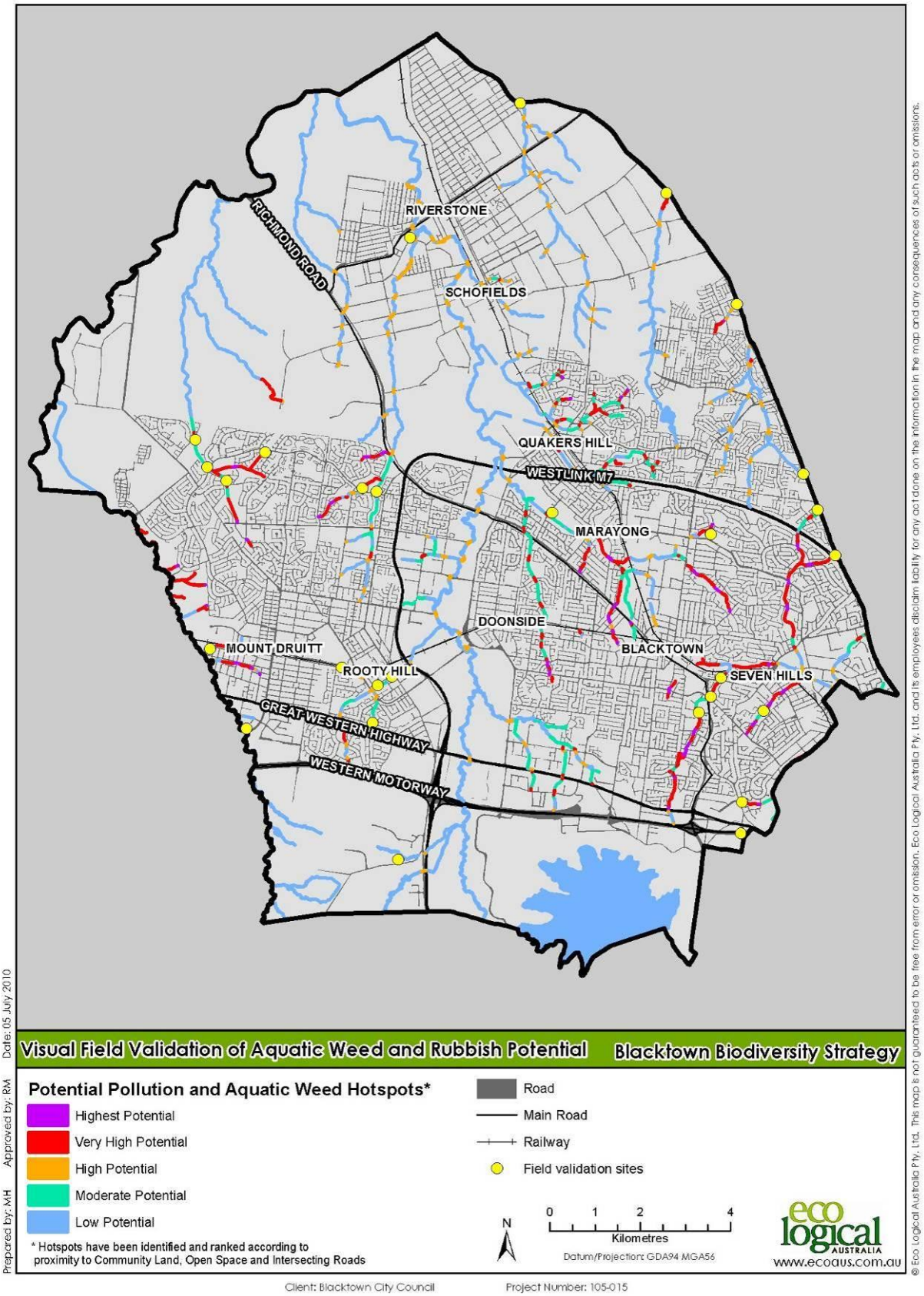


Figure D2: Visual field validation of aquatic weed and rubbish potential

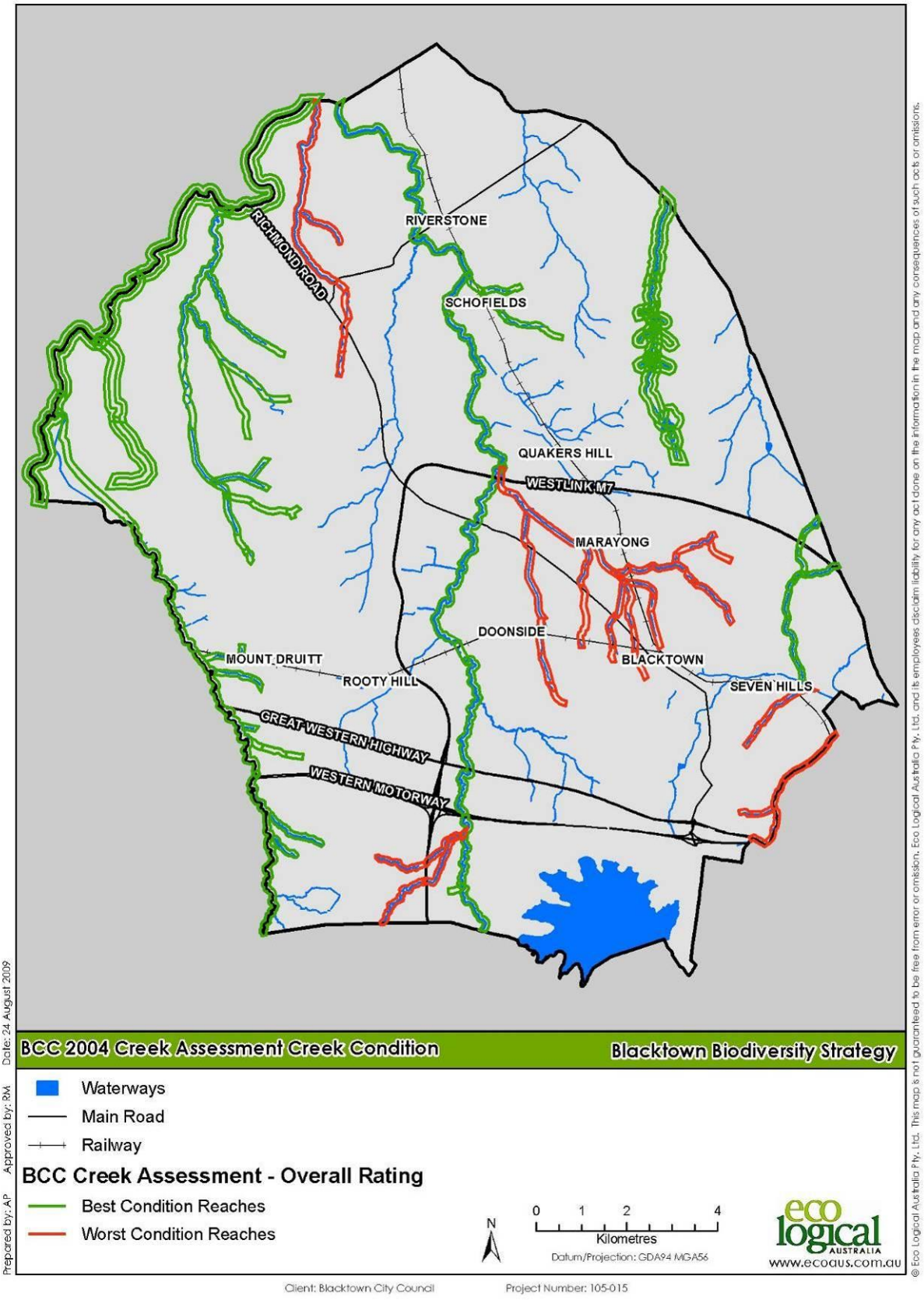


Figure D3 – Creek assessment creek condition (based on *State of Waterways Management Plan 2005*)

Fine-scale criteria

The fine-scale criteria aims to identify more refined and specific spatial information to further prioritise hotspots and aquatic weed and rubbish sources for Blacktown LGA. This step identifies sources of existing and potential information in Council and other agencies that can be used to create the mapping. A set of criteria and methodology for GIS data integration is provided.

SOURCES OF EXISTING INFORMATION

Table D3 below identifies, for each required data layer, the likely sources of information (e.g. council documents, personal communication with agencies, etc.), a methodology by which the data can be integrated into a GIS database, as well as the expected end result that can be used by Council for management purposes.

Table D3: Data development criteria for fine-scale hotspots and rubbish sources

Data to be collected	Source of data	Methodology		Result	
		GIS data creation (method)	Database fields	GIS data output	Mapping/query/reporting options
1. Known areas of weeds	BCC Creek Assessment 2004 (and further assessments)	Step 1: Investigate existing BCC Creek Assessment 2004 database Step 2: Link the database to a spatial reference	As per BCC Creek Assessment 2004	**Known Weed Locations Layer** (Line): Segment of stream with aquatic weed extent and level of infestation	Thematic maps: Noxious weed locations Weed level
2. Known areas of rubbish dumping	BCC Creek Assessment 2004, personal communication with Council officers, Volunteer groups, CMA Officers	Step 1; Investigate existing BCC Creek Assessment 2004 database to determine location of rubbish dumping in 2004. Step 2: Oral mapping & information gathering	Source (Council staff, field work etc) Rubbish Level (H, M, L) (width of rubbish?) Currency (Date)	**Known Rubbish Locations Layer** (Line): Segment of stream with rubbish extent	Thematic maps: Rubbish Level

Data to be collected	Source of data	Methodology		Result	
		GIS data creation (method)	Database fields	GIS data output	Mapping/query/reporting options
		exercise with Council staff, volunteers, CMA officers (identify reaches); field work Step 3: Digitise weed & rubbish locations (for each stream reach) if required Step 4: Tabulate data			
3. Severity of rubbish dumping	Council documents (tonnes of rubbish at each Stormwater Quality Improvement Device SQUID, location of SQUID)	Step 1: Retrieve relevant documents from Council asset systems Step 2: Identify reference location from assets system or digitise SQUID location (point) Step 3: Tabulate SQUID information	Source (Council staff, field work, document REF, etc.) SQUID REF, SQUID location, Rubbish weight (tonnes), Date_collection (date), Date_collection (date), Tonnes/year (tonnes)	**Stream Rubbish Collection Layer (point):** Point along stream where SQUID is located	Thematic map: Rubbish Collection Amounts (colour-graded from high to low using 'Tonnes/year' data if available)
4. Potential pollution/rubbish	BCC Creek Assessment 2004, Council documents,	Step 1: Retrieve relevant documents from Council or extract from Council assets	Source (Pipe/stormwater drain, etc. and stream	**Potential Pollution & Weed hotspots - Other**	Thematic maps: Potential pollution/rubbish

Data to be collected	Source of data	Methodology		Result	
		GIS data creation (method)	Database fields	GIS data output	Mapping/query/reporting options
sources - Other	location of pipes, STP, stormwater drains, etc.	system Step 2: Intersect pipes, STP, stormwater drains with streams (obtain point location) Step 3: Tabulate Information	GIS) Infr_REF (number/name of pipe, etc.)	**layer (points)**	sources - Other locations (points) - symbology showing different types of infrastructure/potential source
5. Treatment information	Works on pipes, rehabilitation, SQUIDS - implementations and designs	Step 1: Retrieve relevant documents from Council assets registers & other agencies Step 2: Digitise & attribute point locations	Source (Pipe/sw drain, etc. and stream GIS) Infr_REF (number/name of pipe, etc.) Planned date of works Date of completion	**Weed and Rubbish Treatments layer** (line)	Thematic maps: Locations (points) - symbology showing types of infrastructure

REFERENCES

Blacktown City Council (2005) *State of the Waterways Management Plan*. Online. [available]:

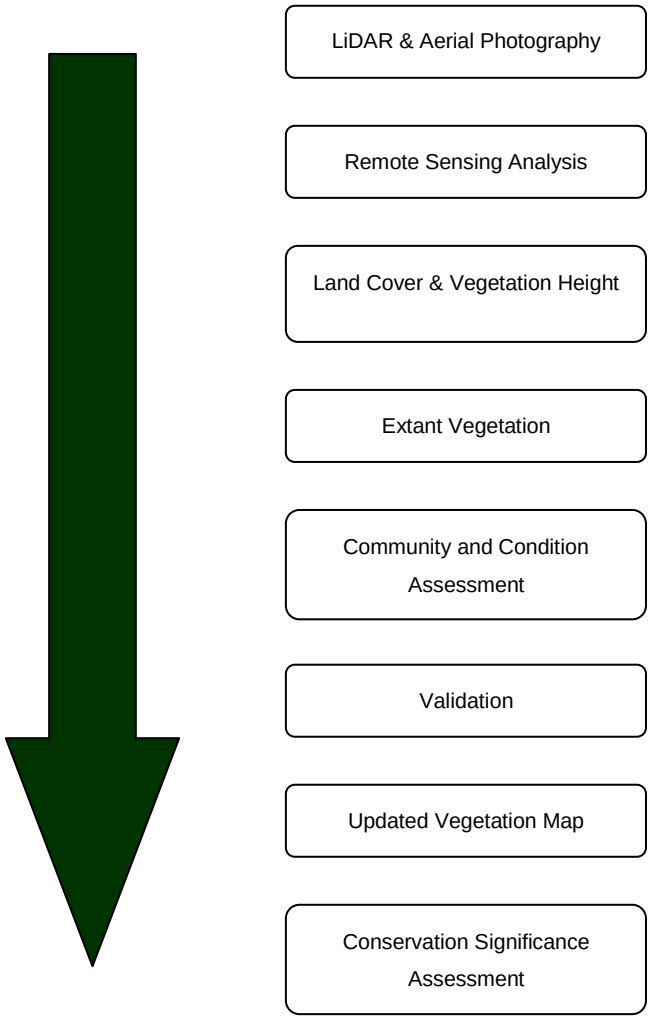
http://www.blacktown.nsw.gov.au/environment/state-of-the-waterways/state-of-the-waterways_home.cfm

Appendix E: Vegetation & biodiversity value mapping

Introduction

This document outlines the methods and results of mapping of vegetation and biodiversity value within the Blacktown City Council LGA.

A set of criteria and methodology was defined to identify the relevant available information and process required to develop an updated extant vegetation map and conservation significance assessment. An overview of this process is shown in the flowchart below.



Update vegetation mapping

The following mapping process was applied to refine vegetation mapping using desktop analysis.

Determination of Native Vegetation Extent

High-resolution (20 cm) data (both LiDAR and aerial photography - 2008) was obtained from Blacktown City Council for the entire LGA in order to determine the current extent of vegetation (at the date of photography). The vegetation extent was determined through an object oriented remote sensing analysis using Ecognition and ArcGIS. The analysis consisted of two initial classification processes. These were:

1. Delineation of major land use classes - cleared/bare soil, water, vegetation, buildings/built-up, etc., and
2. Delineation of vertical structure within 'vegetation' class (based on 'Key to the Structural Forms of Australian Vegetation'), using ALS-derived height differential (DSM - DTM). The height classes were:
    - Grasses - Ground: 0-0.5 m above ground
    - Low Shrubs: 0.5-2 m above ground
    - Tall Shrubs: 2-4 m above ground
    - Low Trees: 4-10 m above ground
    - Medium Trees: 10 m-30 m above ground
    - Tall Trees: 30 m + above ground

A geodatabase was developed to store the resultant information.

The high-resolution data classed as vegetation was first extracted from the geodatabase and resolution was generalised to a 4 m x 4 m grid to provide the appropriate resolution for a regional vegetation dataset and reduce the file size to a manageable size. The 4 m resolution was chosen as an equivalent to 1:8,000 scale. This scale enables appropriate mapping of vegetation at a local level and is in accordance with the project brief.

Areas of vegetation identified as having a vertical structure of low, medium or tall were included as the definition of extant vegetation within the data.

The defined extant vegetation layer was then visually checked against high-resolution 2008 aerial photography provided by Council.

Determination of Vegetation Community and Condition

In order to allocate vegetation community and condition to the extant vegetation data, a combination of existing data sources were used. These were:

- 2002 NPWS Western Sydney Native Vegetation Mapping
- 2002 NPWS Western Sydney Pre 1750 Vegetation Mapping
- 2008 NPWS Western Sydney Native Vegetation Mapping (update)

The three data sets were combined and attributes were associated with the extant vegetation layer to create a base community and condition layer covering the entire LGA.

The condition codes used are provided below in **Table E1**. These codes are amalgamations based on the definitions used by the NPWS in their Western Sydney Native Vegetation Mapping (NPWS 2002a).

Woodland vegetation in good condition, as found in western Sydney, has been defined to have a canopy density of between 10 and 30%. A canopy density less than 10% generally indicates some level of thinning or disturbance (NPWS 2002b).

Table E1: Condition Codes

CONDITION ID	CANOPY DENSITY	DESCRIPTION
Good	>10%	Canopy and understorey in good condition
Poor	<10%	Disturbed vegetation or scattered tree overstorey over agriculture or rural land use, within urban areas

Finalisation of Extant Vegetation Extent

The extant vegetation was finalised in consultation with Blacktown City Council to visually refine the data through filtering out smaller polygons, and smooth the remaining polygons to remove the 'blocky' effect that is a result of remote sensing analysis to meet requirements for use of the data in Council's in house systems. The refinement of the vegetation data included:

- Consolidation and filtering of all large vegetation patches to eliminate holes and gaps in vegetation polygons less than or equal to 400 m^2
- Smooth the boundaries of all polygons greater than 40 m^2 to eliminate the grided structure of the data (using PAEK algorithm with 10m smoothing tolerance in ArcGIS)
- Remove all polygons less than 40 m^2 from the vegetation data

Validation of Community and Condition

Desktop validation was undertaken to improve the accuracy of the community and condition layer. This was based on past field validation carried out across the Blacktown LGA by Eco Logical Australia, NPWS, as well as other consultants. A complete list of data sources is supplied in Attachment 1. Further validation was carried out in June 2010 over areas not well represented by past validation to confirm vegetation community and condition.

Conservation Significance Assessment

The Conservation Significance Assessment (CSA) process enables a number of habitat values to be evaluated. The end result is a map of conservation priority. The following methodology is based on the process set out in the *Guidelines for the Conservation Significance Assessment of the Native Vegetation for the Cumberland Plain* (NPWS 2002), and informed by a modified process used for the Liverpool Biodiversity Strategy (Liverpool City Council and Eco Logical Australia 2003), Penrith Vegetation Mapping project (Penrith Council and Eco Logical Australia, 2005), Camden Council process to support the Natural Assets Policy (Camden Council 2003), and Managing Sydney's Urban Growth (ELA 2003).

The key factors of conservation significance were determined by:

- Status of vegetation community
- Vegetation patch size
- Vegetation patch condition (as per **Table E1**, above)
- Adjacency of vegetation or habitat patches

These key factors are also consistent with the assessment of habitat and the basis of the improve or maintain analysis used in the preparation of the Western Sydney Growth Centres Conservation Plan (GCC 2007).

The final result was a grouping of vegetation into Regionally Significant (Core), Support for Core and Other Remnant Vegetation. An explanation of groupings and the decision rules used can be seen below (**Table E2**).

Explanation of Resultant CSA Categories (NPWS 2002c):

1. Regionally Significant (Core)

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

2. Support for Core

These are areas within the region that provide a range of support values including increasing the size of and buffering of areas identified as Regionally Significant (Core). Support for Core areas offer the greatest potential to have their ecological values enhanced by management works and contribution to the ecological and biodiversity values of the region.

3. Other Remnant Vegetation

The remainder of native vegetation has been classified as Other Remnant Vegetation. These areas are mostly smaller, isolated or poorer quality remnants. Some of the areas classified in this assessment as Other Remnant Vegetation may have local significance.

Table E2: Category Decision Matrix

Categories	Community Status	Buffer Distance	Patch Size	Condition	Adjacency
Regionally Significant (Core)	Critically Endangered	N/A	Any	Good	N/A
	Riparian[#]	<40 m	Any	All	N/A
	Freshwater Wetland*	N/A	Any	All	N/A
	Endangered Ecological Community (EEC)	N/A	Any	Good	N/A
	Non-listed communities	N/A	>=4 Ha	Good	N/A
Support for Core	All vegetation communities	N/A	Any	All	Adjacent
Other Remnant Vegetation	All vegetation that does not fit into above categories, with the exception of Unclassified Veg.				
Other Remnant Vegetation (unclassified vegetation)	Unclassified Vegetation				

**Water bodies are excluded from this assessment process*

[#]*ELA adopted the same definition for Riparian Communities as that used by the NPWS Western Sydney Vegetation Mapping Project (NPWS, 2000b). Riparian Communities are defined in that report as Alluvial Woodland, Riparian Scrub or Riparian Forest*

A distance of 15 m was used to determine if patches were close enough to be considered adjacent. This means that if patches were separated by a small path or track, but still shared ecological values, they were considered adjacent (even if patches were of different condition or vegetation type).

The choice of 15 m to measure adjacency was based on a number of assumptions. It was considered a small enough barrier to enable a range of species to move across it and to allow seed dispersal, but still large enough that major roads and other large barriers to movement were not included.

Undertaking the CSA

The CSA was performed using GIS software. The decision rules outlined above (**Table 2**) were followed, and two fields were added to the data layer. These fields were 'CSA', which identifies the CSA category that a polygon belongs to, and 'REASON', which identifies which decision rule was responsible for the category allocation.

The analysis was carried out in the order below:

1. Critically endangered ecological communities[15] (CEECs) were identified and tagged as Core. Areas of scattered urban trees were not considered. The definition for CEECs was the same as that used by the NPWS (2002c)
2. Endangered Ecological Communities (EECs) were identified and tagged as Core with any patch size. Only areas in 'good' condition were considered Core
3. All other communities >=4 Ha were tagged as Core. Only areas in 'good' condition were considered Core
4. A digital data layer of 1:25,000 drainage lines was buffered to 40 m either side of the line. This buffered layer was used to identify all Riparian Communities within 40 m of a drainage line. Riparian Communities were defined as Alluvial Woodland, Riparian Forest or Riparian Scrub (NPWS, 2000b)
5. All communities within 15 m of a Core area were tagged as Support for Core. These areas were identified using a Proximity Analysis
6. All remaining vegetation, no matter the size or condition, was tagged Other Remnant Vegetation
7. Any unclassified vegetation was tagged Other Remnant Vegetation - Unclassified

Limitations of CSA

The CSA assessment process takes a landscape based approach. It does not aim to identify all the ecological values found in the study area. It uses vegetation communities as a surrogate for habitat value and does not consider individual species habitat requirements or broad ecological process in detail. This process does not attempt to be a definitive assessment of all ecological values of the area.

[15] Refer to DECCW website for further information about EECs

http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/home_tec.aspx

Areas that have not been allocated values at this regional level study may still support ecological values, including threatened flora and fauna.

The use of patch size is a significant determinant in the CSA methodology. An assumption has been made, based on currently accepted principles (GCC 2007), that 4 Ha is a 'viable' patch. Viability of the patch is going to vary depending on what vegetation community type it is, the shape of the patch, a number of condition variables, and the ongoing threats to the patch (adjoining land use, position in the catchment, etc.).

Resultant Vegetation Communities

The distribution of vegetation communities across the Blacktown LGA can be seen in **Figure E1** and a detailed breakdown of area of the vegetation community and its condition is reported in **Table E3**.

Table E3 - Vegetation Community and Condition Statistics

VEGETATION COMMUNITY	EXISTING COVERAGE (Ha)	CCM* (Ha)
Alluvial Woodland	449.2	65.3
Castlereagh Scribbly Gum Woodland	16.9	1.9
Castlereagh Swamp Woodland	18.4	0
Cooks River Castlereagh Ironbark Forest	188.5	2.2
Freshwater Wetlands	3.1	0
Riparian Woodland	3.3	3.2
Shale Gravel Transition Forest	454.6	0.3
Shale Hills Woodland	210.5	11.8
Shale Plains Woodland	878.0	117.0
Shale Sandstone Transition Forest (High Sandstone Influence)	3.5	0
Shale Sandstone Transition Forest (Low Sandstone Influence)	3.7	0
Total Extant Vegetation Communities	2229.7	398.20
Scattered trees <10% canopy	2351.9	196.4

*Lands under the care, control or management of Blacktown City Council

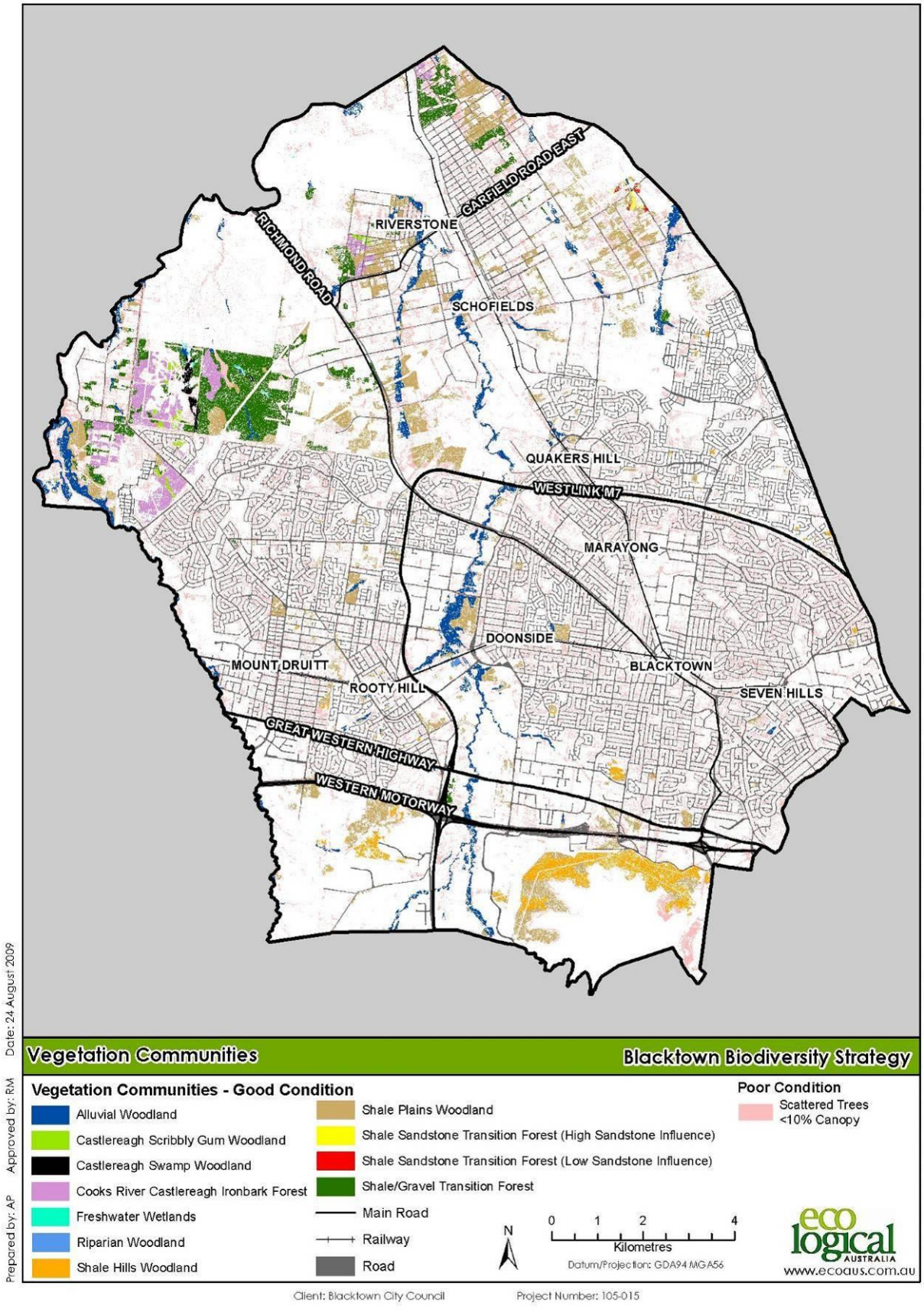


Figure E1 - Vegetation Communities

Vegetation Validation

A validation exercise was identified to confirm and refine the extant vegetation community and condition. The process incorporated the collation of data from known areas that had been visited for the purpose of validation of existing vegetation mapping. The information incorporates validation sites visited by NSW NPWS as part of the Western Sydney mapping project, AMBS as part of a land assessment in and around Second Ponds Creek, as well as a number of areas visited by Eco Logical Australia through various ecological assessment projects.

The NPWS validation sites, although dated, were based on larger, consolidated and intact areas of vegetation which are primarily reserved for conservation. These areas were not considered to have a high risk of change from the date of survey, especially since these sites were also validly used by DECCW as part of the vegetation mapping update carried out across western Sydney in 2007.

Figure E2 shows the distribution of where these sites are located across the LGA and **Table E4** shows the area of vegetation validated by each program/project. In all, over 19% of the extant vegetation within the study area has been validated using this process.

Table E4: Areas of Vegetation Validated from All Sources

VALIDATION SOURCE	AREA (Ha)
NPWS - 2002 Western Sydney Mapping Validation	518.97
Percentage of Total Vegetation	**23.28%**
AMBS - Ponds Creek	28.34
Percentage of Total Vegetation	**1.27%**
ELA - Alex Avenue	12.54
ELA - Area 20	66.50
ELA - Blacktown Olympic Park	6.12
ELA - Doonside	44.42
ELA - Hampton Crescent	6.06
ELA - Integral - Glendenning	1.32
ELA - Marsden Park	154.74
ELA - Riverstone Growth Centre Commission	4.92
ELA - Rooty Hill	0.80
ELA - APP Western Sydney Parklands	15.01
ELA - Whalan Tregear	17.81
Percentage of Total Vegetation	**14.81%**
ELA - June 2010 Validation	7.22
Total Area of Validated Vegetation	**884.77**
Percentage of Total Vegetation	**39.68%**

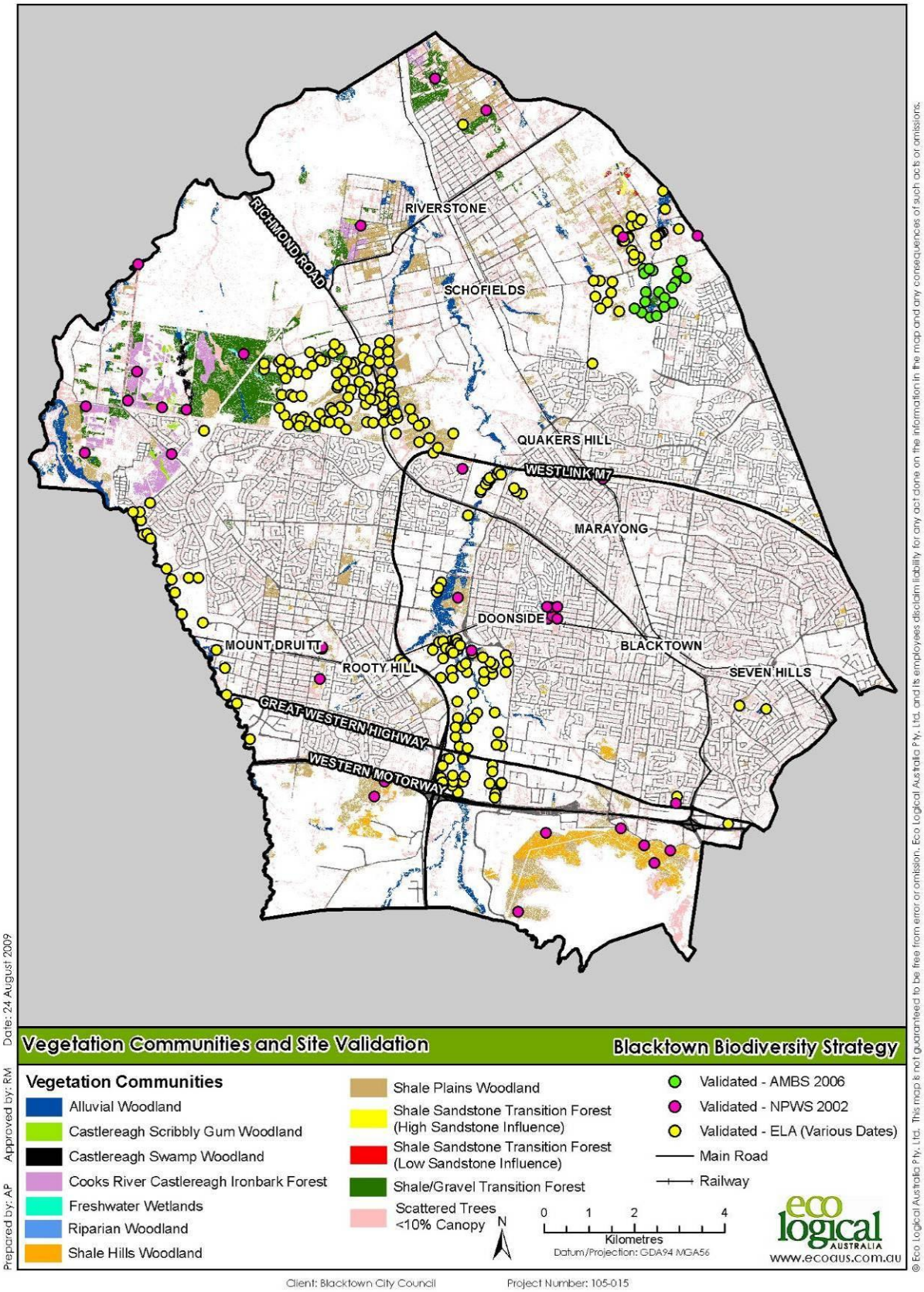


Figure E2: Vegetation Communities and Site Validation

Conservation Significance Assessment

The distribution of the Conservation Significance Assessment values can be seen in **Figure E3** and a breakdown of area within each CSA is reported in **Table E5**.

Table E5: CSA Statistics

CSA	Total (Ha)	CCM* (Ha)
Core	2438.83	242.7
Support for Core	343.83	34.4
Other Remnant Vegetation	1793.77	121.1
Sum	**4576.43**	**398.2**

*Lands under the care, control or management of Blacktown City Council

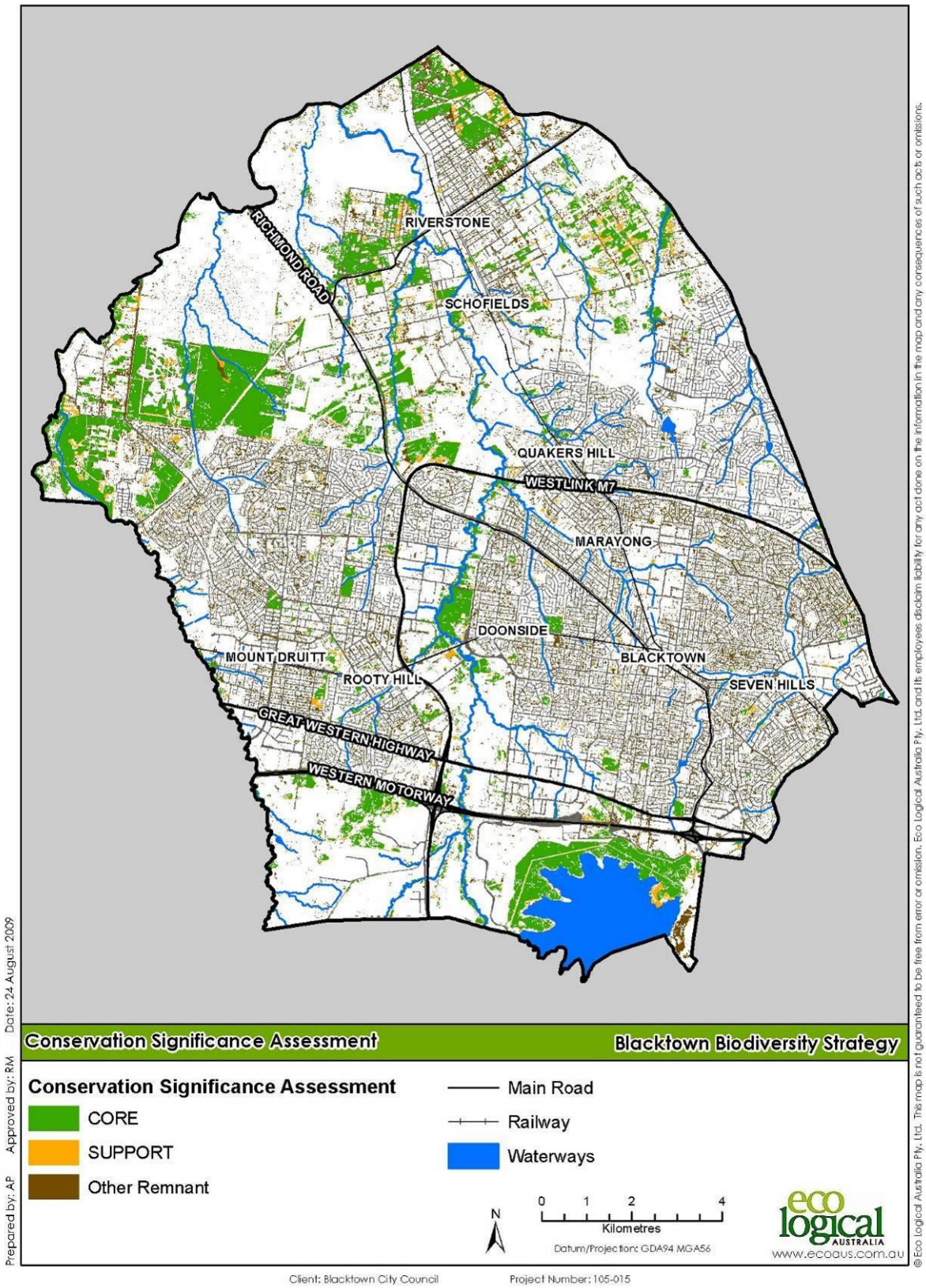


Figure E3: Conservation Significance Assessment

References

Eco Logical Australia (ELA) (2003) Ecological Assessment, North West Study Area. Managing Sydney's Urban Growth. Report prepared for Planning NSW. Unpublished.

Growth Centres Commission (GCC) (2007) Growth Centres Conservation Plan. Exhibition Draft. January 2007.

Liverpool City Council & Eco Logical Australia (2003) Biodiversity Strategy. [online].

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NSW National Parks and Wildlife Service (NPWS) (2002b). Native vegetation maps of the Cumberland Plain, Western Sydney: Interpretation guidelines (final edition). NSW National Parks and Wildlife Service, Central Directorate, October 2002.

NSW National Parks and Wildlife Service (2002c) Guidelines for the Conservation Significance Assessment of the Native Vegetation of the Cumberland Plain, Western Sydney. National Parks and Wildlife Service, Central Directorate, October 2002.

Attachment 1

The following programs/assessments conducted standardised field-based vegetation community and condition validation. The list is broken down by the organisation carrying out the validation and the associated program.

NSW NPWS (now DECCW):

Validation points from NPWS 2002 mapping - 37 sites.

Eco Logical Australia

ELA Validation Jobs:

- Alex Ave Precinct Ecological Constraints 2008 - 9 sites
- Western Sydney Precincts Ecological Assessment 2008 - 12 sites
- Area 20 Precinct Planning Biodiversity Study 2009 - 30 sites
- Doonside Conservation Strategy 2008 - 38 sites
- Integral Glendenning Flora and Fauna 2009 - 15 sites
- Marsden Park Employment Precinct Flora and Fauna 2008 - 99 sites
- Rooty Hill Site Capability 2008 - 4 sites
- Blacktown Olympic Park Flora and Fauna 2008 - 16 sites
- Hampton Crescent Offset Property Review 2006 - 1 site
- Whalan Reserve Masterplan 2007 - 13 sites

Australian Museum Business Services (AMBS)

Ponds Creek 2006 mapping -19 sites

Appendix F: Threatened species, populations & communities, & migratory species

The following table was compiled using records from the NSW Wildlife Atlas and EPBC Protected Matters database. The most recent date of each Atlas record is indicated. The databases were searched in June 2010. In the table: E = endangered, V = vulnerable, CE = critically endangered and M = Migratory.

Note that there are also two species of fish that are recognised as threatened under the *Fisheries Management Act.*

Scientific Name	Common Name	TSC Status	EPBC Status	Last date of Wildlife Atlas record
Flora				
Acacia bynoeana	Bynoe's Wattle	E1	V	EPBC report indicates it is likely to occur, but there are no Atlas records
Acacia pubescens	Downy Wattle	V	V	28/2/1998
Cynanchum elegans	White-flowered Wax Plant	E1	E	EPBC report indicates it is likely to occur, but there are no Atlas records
Dillwynia tenuifolia		V	V	15/10/2008
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	V	-	24/03/2010
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	V	V	EPBC report indicates it is likely to occur, but there are no Atlas records
Melaleuca deanei	Deane's Paperbark	V	V	19/9/2007
Micromyrtus minutiflora		E1	V	4/3/2008
Persoonia nutans	Nodding Geebung	E1	E	30/7/2004
Pilularia novae-hollandiae	Austral Pillwort	E1	-	3/1/1966

Scientific Name	Common Name	TSC Status	EPBC Status	Last date of Wildlife Atlas record
Pimelea curviflora var. Curviflora		V	V	17/5/1996
Pimelea spicata	Spiked Rice-flower	E1	E	18/4/2006
Pomaderris brunnea	Rufous Pomaderris	V	V	EPBC report indicates it is likely to occur, but there are no Atlas records
Pterostylis gibbosa	Illawarra Greenhood	E	E	EPBC report indicates it is likely to occur, but there are no Atlas records
Pterostylis saxicola	Sydney Plains Greenhood	E1	E	No date given
Pultenaea parviflora		E1	V	19/9/2008
Syzygium paniculatum	Magenta Lilly Pilly	V	V	29/9/2003
Populations				
Marsdenia viridiflora subsp. *viridiflora*	*Marsdenia viridiflora* R. Br. Subsp. *viridflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas.	E2	-	12/02/2008
Ecological Communities				
Cumberland Plain Woodland		E4	CE	
Shale Gravel Transition Forest		E4	CE	
Shale/Sandstone Transition Forest		E4	E	
Sydney Coastal River-flat Forest		E4	-	
Sydney Turpentine Ironbark Forest		E4	-	
Castlereagh Swamp Woodland		E4	-	
Cooks River/Castlereagh Ironbark Forest		E4	-	

Scientific Name	Common Name	TSC Status	EPBC Status	Last date of Wildlife Atlas record
Amphibians				
Litoria aurea	Green and Golden Bell Frog	E1	V	15/7/2005
Litoria raniformis	Southern Bell Frog	E1	V	EPBC report indicates it is likely to occur, but there are no Atlas records
Heleioporus australiacus	Giant Burrowing Frog	V	V	26/1/1997
Birds				
Pyrrholaemus sagittatus	Speckled Warbler	V	-	10/4/2006
Lophoictinia isura	Square-tailed Kite	V	-	24/3/1996
Oxyura australis	Blue-billed Duck	V	-	31/1/1989

Scientific Name	Common Name	TSC Status	EPBC Status	Last date of Wildlife Atlas record
Botaurus poiciloptilus	Australasian Bittern	E1	-	2/6/1970
Daphoenositta chrysoptera	Varied Sittella	V	-	15/6/2006
Petroica boodang	Scarley Robin	V	-	29/5/2008
Petrocia phoenicea	Flame Robin	V	-	30/5/1996
Hieraaetus morphnoides	Little Eagle	V	-	23/4/2009
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-	27/5/1997
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	1/2/2007
Anthochaera phrygia	Regent Honeyeater	E4A	E, M	11/6/1995
Lathamus discolor	Swift Parrot	E1	E	30/7/2006
Neophema pulchella	Turquoise Parrot	V		15/4/1999
Rostratula australis	Australian Painted Snipe	E1	V	EPBC report indicates it is likely to occur, but there are no Atlas records
Ninox connivens	Barking Owl	V	-	30/6/1996
Ninox strenua	Powerful Owl	V	-	26/6/1996
Tyto novaehollandiae	Masked Owl	V	-	29/8/2006
Haliaeetus leucogaster	White-bellied Sea-Eagle	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records
Hirundapus caudacutus	White-throated Needletail	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records
Merops ornatus	Rainbow Bee-eater	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records
Monarcha melanopsis	Black-faced Monarch	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records
Myiagra cyanoleuca	Satin Flycatcher	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records
Rhipidura rufifrons	Rufous Fantail	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records
Ardea alba	Great Egret	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records
Ardea ibis	Cattle Egret	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records
Gallinago hardwickii	Latham's Snipe	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records

Scientific Name	Common Name	TSC Status	EPBC Status	Last date of Wildlife Atlas record
Rostratula benghalensis s. lat.	Painted Snipe	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records
Apus pacificus	Fork-tailed Swift	-	M	EPBC report indicates it is likely to occur, but there are no Atlas records
Gastropods				
Meridolum corneovirens	Cumberland Plain Land Snail	E1	-	23/4/2009
Mammals				
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed Quoll	V	E	13/9/2005
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	23/1/2003
Petrogale penicillata	Brush-tailed Rock-wallaby	E1	V	EPBC report indicates it is likely to occur, but there are no Atlas records
Mormopterus norfolkensis	Eastern Freetail-bat	V	-	12/5/2009
Phascolarctos cinereus	Koala	V	-	12/4/2006
Potorous tridactylus tridactylus	Long-nosed Potoroo (SE mainland)	V	V	EPBC report indicates it is likely to occur, but there are no Atlas records
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	23/4/2009
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	23/1/2003
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	28/8/2007
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-	12/5/2009
Myotis macropus	Southern Myotis	V	-	12/5/2009
Pseudomys novaehollandiae	New Holland Mouse	-	V	EPBC report indicates it is likely to occur, but there are no Atlas records
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	2/9/2006
Reptiles				
Hoplocephalus bungaroides	Broad-headed Snake	E1	V	EPBC report indicates it is likely to occur, but there are no Atlas records

Appendix G: Carbon mapping criteria

Introduction

This document describes the process and methods carried out to develop mapping of broad potential areas for carbon sequestration opportunities over the entire Blacktown LGA in accordance with Kyoto and currently proposed Federal Carbon Pollution Reduction Scheme biosequestration requirements.

The mapping exercise has been carried out to provide Council with a strategic tool to combine carbon sequestration opportunities across the LGA within identified biodiversity objectives.

The mapping identified potential eligible lands within the council boundaries and assessed them against a set of criteria designed to test their eligibility with the Kyoto Protocol, CPRS and GGAS at a broad level. While the mapping identifies and prioritises lands for carbon sequestration, the mapping is for use at a strategic level to flag key areas and should be supported by subsequent detailed assessment on site at a parcel by parcel level for suitability under the various schemes.

The Federal Government has not finalised the legislation on the CPRS but all attempts have been made to comply with the latest available information on the eligibility and identification of potential areas for carbon sequestration.

A desktop methodology has been used, based on Kyoto eligibility criteria and discussions with Council staff. In this project, high-resolution data (LiDAR+imagery) has been used to obtain refined extant vegetation boundaries and impervious ground cover as key supporting information for determining eligible lands. A summary flowchart of the process is provided below in **Figure G1**. Each of the process components are described in more detail in the following sections.

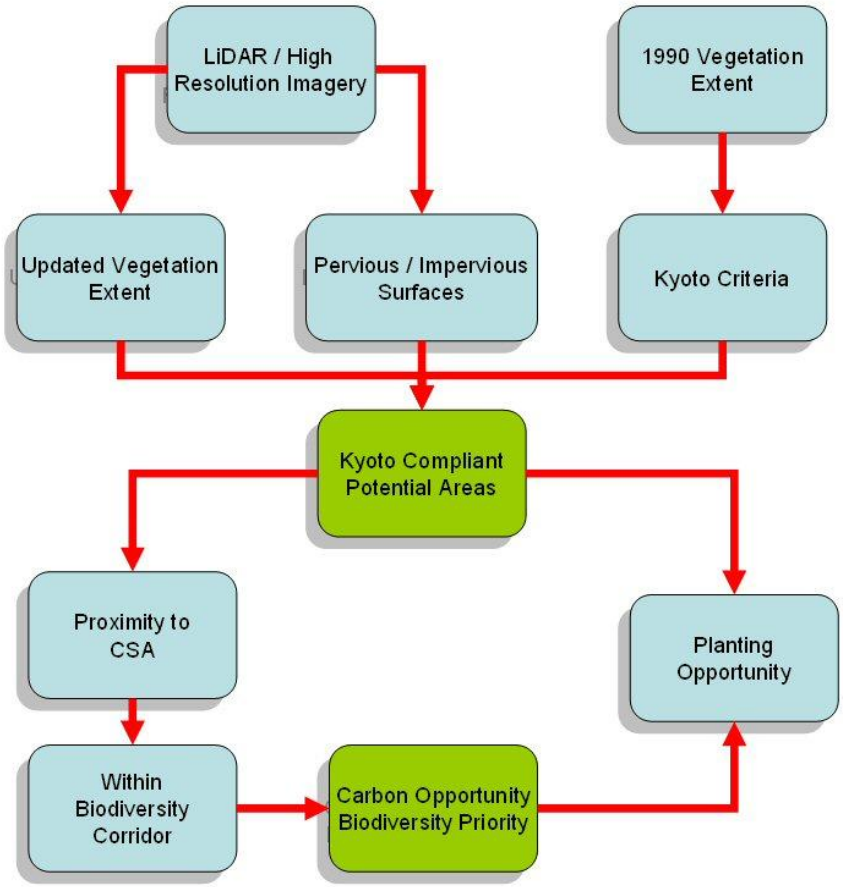

Figure G1: Carbon mapping desktop methodology

Methods

The process for development of carbon mapping within Blacktown LGA is outlined below. This process identifies the development of appropriate mapping layers that identify potential areas for carbon biosequestration that comply with Kyoto protocols in an Australian context. The analysis has also prioritised areas that contribute to achieving biodiversity targets in the LGA.

Kyoto Protocol compliant potential for planting

The Kyoto Protocol sets the framework for the definition of a forest sink project. Article 3.3 of the Kyoto Protocol currently provides that a key component of the project is to demonstrate compliance to the principles outlined in the Kyoto Protocol.

For an Australian Forestry project to be Kyoto compliant, a planting must exhibit the following features:

- The site must have been predominately clear of vegetation (less than 20% tree cover) on 31st December 1989
- The site must have been revegetated after 1st January 1990
- The site must have been revegetated by seeding or other human action
- The vegetation established must be able to reach a height of at least two meters
- The vegetations top layer must reach a crown (shade) covering of greater than 20%, and
- The site must be at least 0.2 Ha

Areas of potential of carbon sequestration should be revegetated with species from locally occurring vegetation communities. Revegetation should be guided by the pre-1750 vegetation mapping (**Figure G2**). For species composition of the vegetation communities, refer to DECCW website at:

http://www.environment.nsw.gov.au/resources/nature/cumbPlainMappingInterpguidelines.pdf.

The process used to identify areas of potential carbon sequestration within the BCC LGA is outlined below:

Step 1 - Vegetation potential

Areas with no extant vegetation (0% canopy) as at February 2008 were obtained from updated vegetation extent mapping using an analysis of high resolution (20 cm) remotely sensed data (both LiDAR and aerial photography) (BCC 2008).

Areas that had extant vegetation in 1989/1990 (Barson *et al*, 2000) with >20% canopy cover were then removed (this data was obtained from 25 m resolution September 1989/September 1990 Landsat TM satellite data, from the Bureau of Rural Sciences (BRS) and confirmed against 1988 aerial photography (from BCC)) (Figure 3).

Step 2 - Pervious surface

Areas having an impervious surface were identified from 4 m resolution land cover analysis (using LiDAR and aerial photography (BCC 2008)) as identified through a vegetation update process. These areas of impervious surface were then removed from the output of step 1. This step was carried out to limit the areas identified to where any future planting is physically possible and to eliminate the inclusion of areas of hard surfaces such as roads and other hard surface areas.

Step 3 - Kyoto Protocol Compliance

To comply with the Kyoto Protocol in Australia, areas meeting the following criteria were removed from the output of Step 2.

- Areas (polygons) of >0.2 Ha in size, and
- Areas that were >10 m in width

The outputs of these steps created a carbon opportunity potential layer. This layer identified areas that had potential for carbon sequestration.

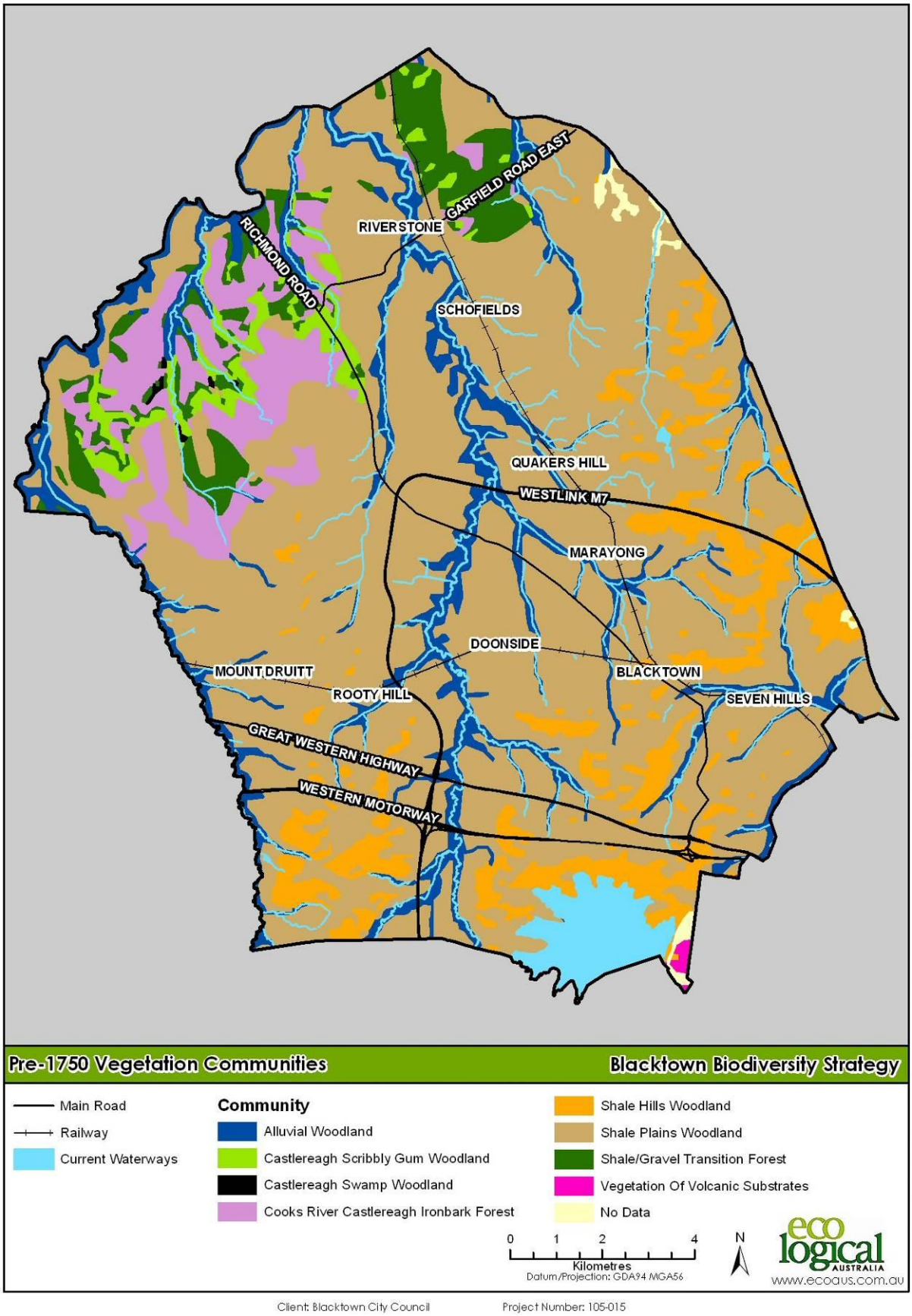

Figure G2: Pre-1750 vegetation communities - modelled distribution (Tozer 2000)

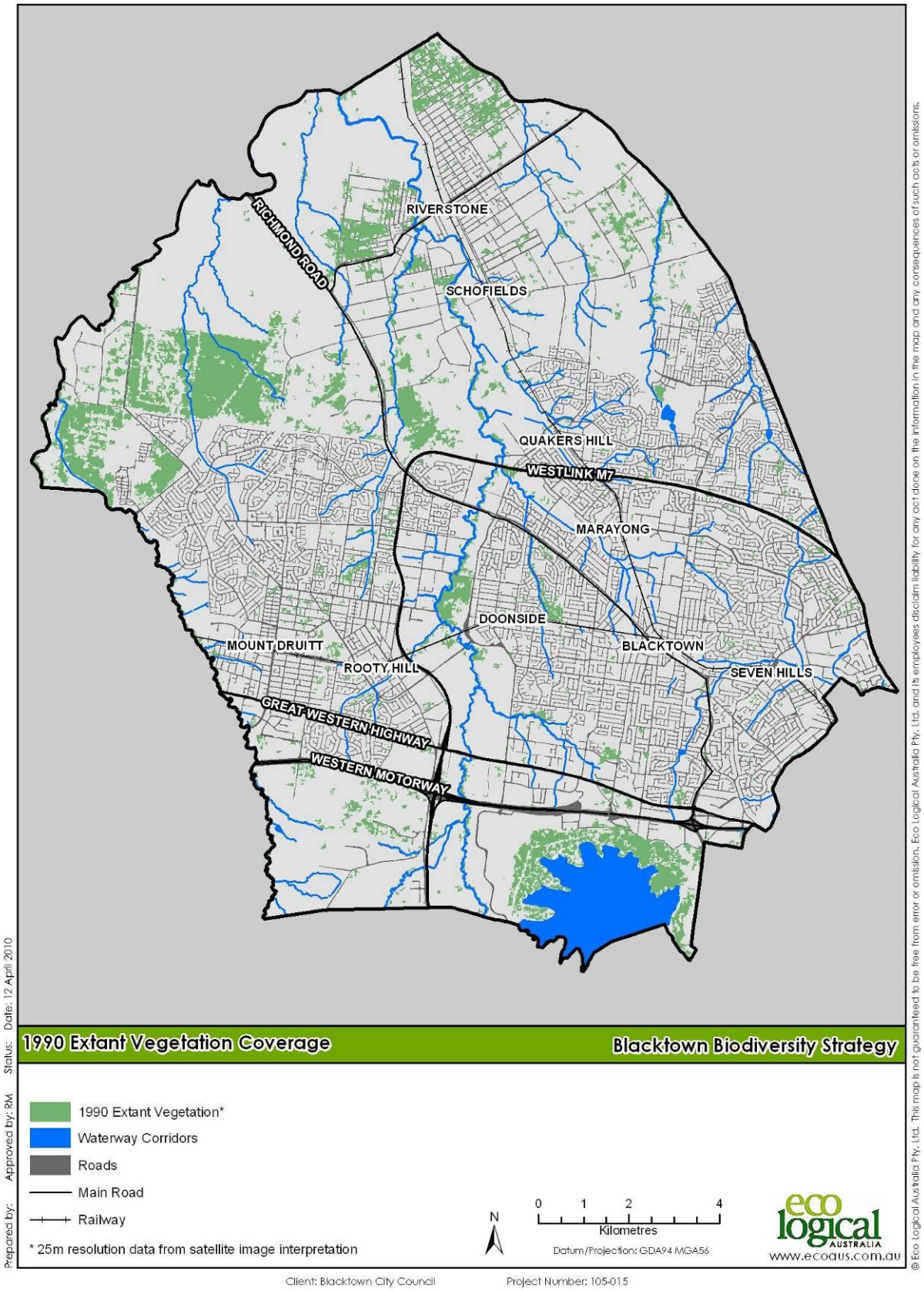

Figure G3: 1990 Extant Vegetation Coverage

Kyoto Potential and Biodiversity Value

The area identified as compliant with Kyoto Protocol in Australia was then intersected with the identified Conservation Significance Assessment (CSA) and potential regional corridors analysis results to identify locations and areas where both high biodiversity values and potential opportunities for planting occur. These areas are prioritised for investigation for planting associated with a greater potential to enhance biodiversity values within the LGA. The prioritisation process is described in the following steps.

Step 1 - Adjacency to CSA Ranking

The Kyoto compliant polygons were analysed to determine adjacency (within 15 m) to vegetation with conservation significance. Polygons were assigned a priority based on their adjacency to either Core, Support for Core or Other Remnant Vegetation. This includes polygons that are:

- Wholly within 15 m of CSA ranking
- Partly within 15 m and not greater than 200 m from CSA ranking

Any polygon within 15 m of CSA ranking, but also extending greater than 200 m from the CSA ranking, was assigned a value of very low (VL). Where a single polygon was adjacent to two or more CSA ranks the highest rank was assigned to the polygon.

The decision matrix to determine the initial priority ranking based on Kyoto Protocol compliance and conservation significance is set out in **Table G1** below.

Table G1: Designation of initial priority rank

	CONSERVATION SIGNIFICANCE ASSESSMENT			
	CORE	SUPPORT FOR CORE	OTHER REMNANT VEGETATION	NO ADJACENCY
Potential Carbon Opportunity	H	M	L	VL

Step 2 - Within Identified Corridor

The priority ranking from the previous step was then escalated one level where the polygon was located within an identified corridor. The priority ranking matrix is summarised in **Table G2**, below.

Table G2: Designation of final priority rank

	IDENTIFIED CORRIDOR RANKING	
INITIAL PRIORITY RANKING	WITHIN IDENTIFIED CORRIDOR	OUTSIDE IDENTIFIED CORRIDOR
H	VH	H
M	H	M
L	M	L
VL	L	VL

Existing plantings to be considered for Carbon Biosequestration ('Back-counting')

Locations, areas and dates of identified plantings or vegetation regeneration/regrowth were mapped where possible. The revegetated areas were identified as Kyoto compliant and planted post-1990.

Data was collected from three main sources:

1. Mapped Blacktown City Council Revegetation and Bushcare areas (GIS shapefiles identifying parcels where work has been carried out). This data lacked date information. It is also unknown what percentage of the land parcel mapped has actually undergone revegetation

2. 1988 air photos were visually checked against 2008 air photos for lots that had >0.2 Ha of revegetation/planting between 1988 and 2008. 1988 aerial photography is not currently available as rectified imagery, so inspection of photo tiles was based on an interpretation of the photo tile identification number on a photo run index map. The air photo interpretation was unable to determine exact dates of plantings. This process also picked up areas of natural regeneration in addition to areas planted as there was no way to distinguish between the two

3. Areas of revegetation had been previously mapped for the *Western Sydney Parklands Biodiversity Restoration Strategy* (ELA 2008) based on information supplied by Greening Australia and the Department of Planning. This data included accurate date information so was able to be categorised

It is important to note that none of the above information on planting has been field validated and as such, any data produced from this step is approximate only. Further investigation into these areas to determine exact areas, dates of plantings and types of plantings is recommended.

Other limitations to this process include:

- There is only limited information on revegetation records available (date, size, planting numbers) within BCC
- Use of non-rectified imagery is time consuming and is inherently problematic in distinguishing between planting and natural revegetation, particularly where appropriate planting records are not available
- This process is best carried out as part of an intensive field validation process, which is outside of the scope of this exercise

Carbon Potential Field Validation

Sample field validation of polygons determined as having carbon potential as per areas identified by the process documented in **Section 2.1** above, was undertaken in early August 2009 and supplemented in June 2010. The purpose of this field validation was to determine the type of land that had been designated as having potential for planting for carbon biosequestration. Polygons were selected throughout the LGA based on accessibility. Each polygon was described in terms of its land use and potential for future planting based on current vegetation cover, pervious/non pervious surface and current observed land use. Photographs were taken to record a visual interpretation of each site.

Results

Kyoto Protocol compliant potential for planting

The total area within Blacktown LGA considered having potential for Kyoto Protocol compliant planting was estimated to be 9,253 Ha. These areas are shown in **Figure G4** below.

The mapping completed as part of this project provides strategic direction and general compliance with Kyoto. However, the process does not take current land use or council zoning into consideration. This mapping may also identify areas that include a land use which may not be suitable for planting such as sports fields and ovals, areas reserved for water retention, and areas within dedicated easements with incompatible land use (such as cleared areas under powerlines).

Prior to proceeding to nomination of any specific areas for revegetation works, the Regenesis Site Compliance and Selection Criteria must be completed on a site-by-site basis to determine suitability for revegetation as a biosequestration forest.

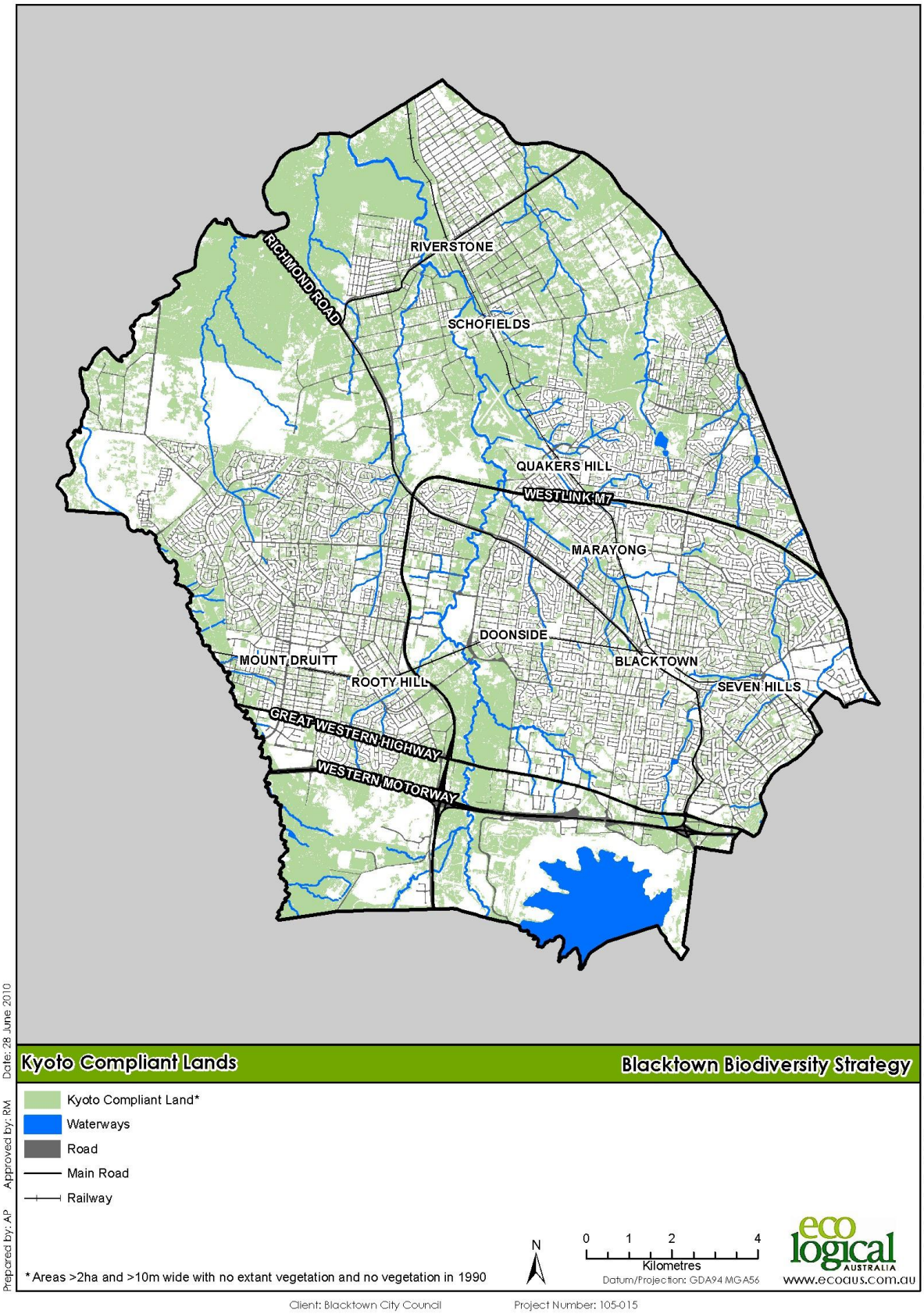

Figure G4: Kyoto Protocol compliant lands with potential for carbon biosequestration

Kyoto Potential and Biodiversity Value

Potential carbon biosequestration areas were prioritised with consideration to adjacent biodiversity value (**Figure G5**). **Table G3**, below, shows the distribution of area within each priority across the LGA.

Table G3: Area of prioritised Kyoto Protocol compliant land

PRIORITY	AREA (Ha)	CCM* (Ha)
VH	548.5	106.7
H	326.0	61.9
M	620.3	180.0
L	3,437.1	453.8
VL	4,321.2	109.9
Total	**9,253.1**	**912.3**

*Lands under the care, control and management of Blacktown City Council

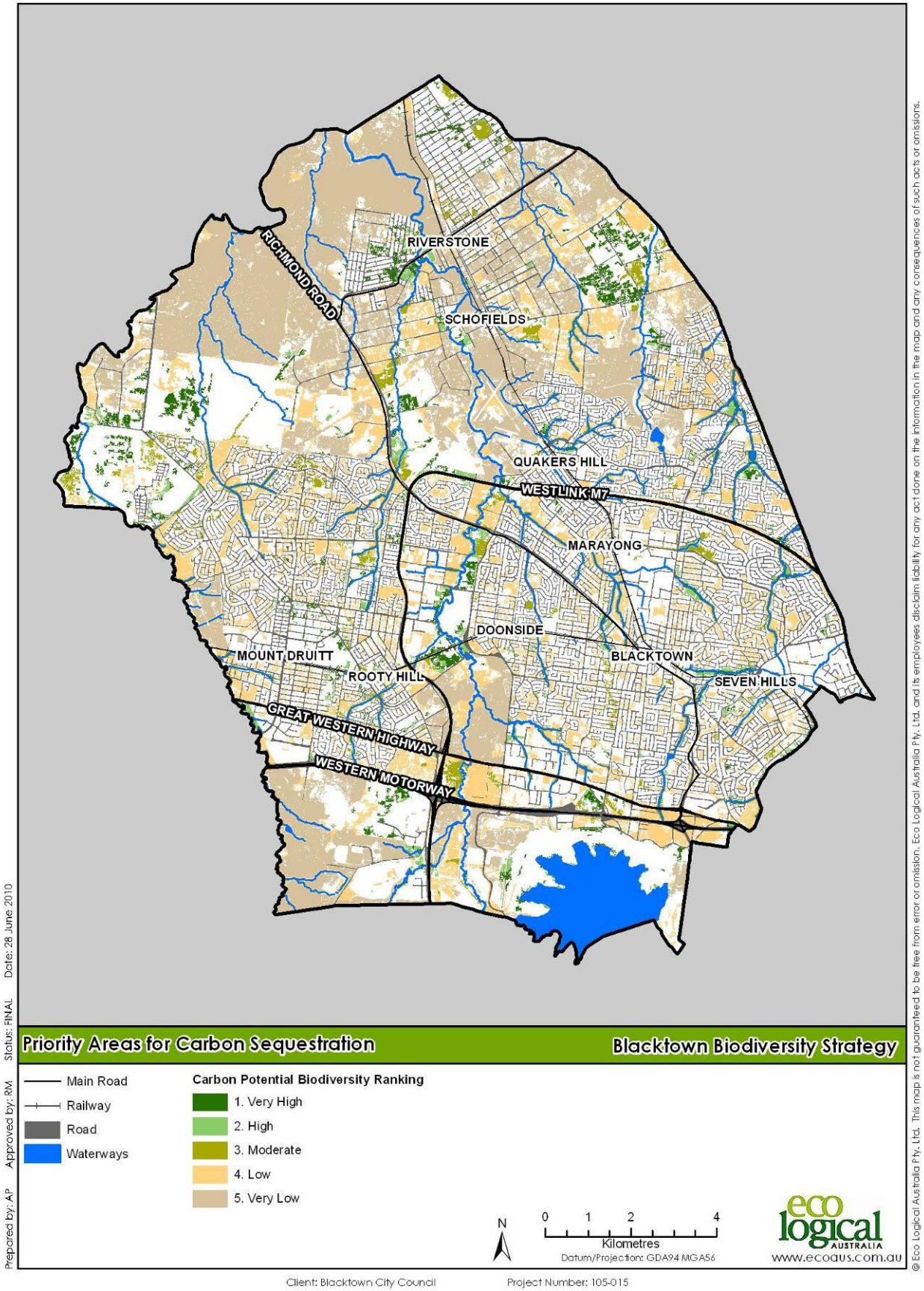

Figure G5: Kyoto Protocol compliant potential lands prioritised by biodiversity value

Existing plantings considered for carbon biosequestration ('Back-counting')

The identified areas of potential Kyoto Protocol compliant plantings or areas of revegetation from different sources are listed in **Table G4** and shown in **Figure G6** below. Note that these are approximate areas only and that the reliability of data is variable for each source.

Table G4: Area of possible identified existing Kyoto Protocol compliant plantings

PLANTINGS	AREA (Ha)
WSP Plantings - unknown date	28.31
BCC areas planted (identified from 1988 air photos)	307.5
Total	**335.81**

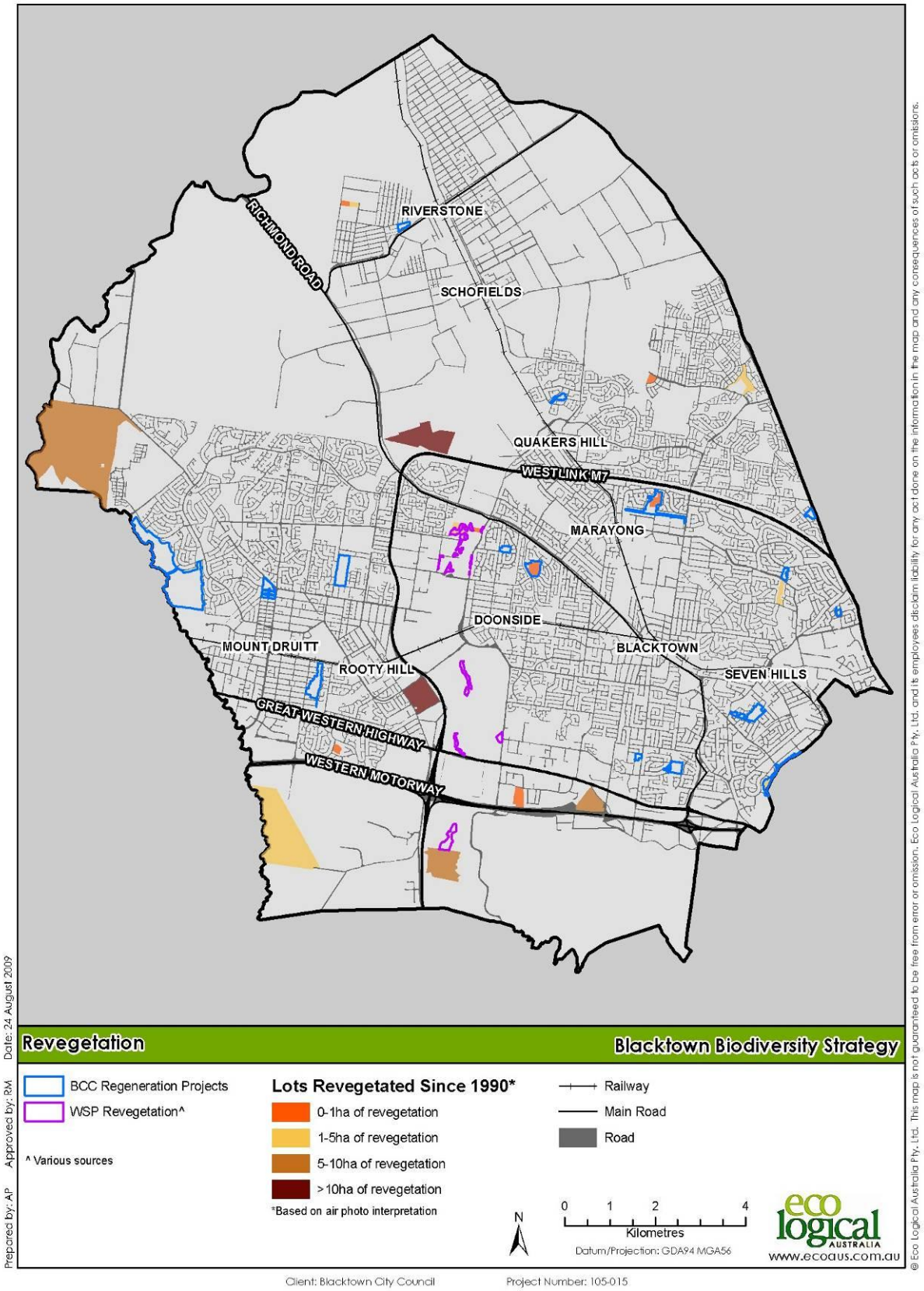

Figure G6: Existing areas of potentially Kyoto Protocol compliant revegetation

Carbon Potential Field Validation

A total of 52 sites were validated across the LGA in August 2009 and June 2010 (**Table G5**). The total area of field validated polygons was 4,552 Ha or 49.2% of the total area of all potential polygons (**Table G6**). The distribution of validation sites is shown in **Figure G7**.

Table G5: Total area of field validated polygons

	AREA (Ha)	% OF TOTAL POTENTIAL AREAS
Validated	4,570	49.4
Not Validated	4,683	50.6
Total	**9,253**	**100**

The land use for each of the 52 validation sites was categorised into eight classes (**Table G6**). Land use classes where planting was not able to occur were removed from the carbon potential mapping. This includes such classes as:

- Mown storm water easement
- Mown powerline easement
- Racecourse
- Sports fields

The photographs below (Photos 1-5) are examples of some of the land categories listed in **Table G6**. Their locations are shown in **Figure G7**.

Table G6: Land categories

FIELD VALIDATION CATEGORY	NUMBER OF SITES VISITED
Managed private grassland/lawn	2
Grazing	17
Unmanaged grassland	6
Mown stormwater easement*	2
Mown powerline easement*	6
Park with scattered trees	8
Racecourse*	1
Sports fields*	10
Total	**52**

* These lands may have limited or no revegetation potential

Photo 1 - Unmanaged grassland

This category provides good potential for either enhancement of existing vegetation or revegetation. Any plantings need to be in line with the current land use/ownership objectives

Photo 2 - Grazing

This category provides good potential for revegetation. Any plantings need to be in line with the current land use/ownership objectives

Photo 3 - Park with scattered trees

This category provides limited potential for both enhancement of existing vegetation or revegetation of grassland areas. Any plantings need to be in line with the current land use objectives

Photo 4 - Sports field

This category provides no potential for planting

Photo 5 - Powerline easement

This category provides only minimal potential for planting. Any plantings need to be in line with the current land use objectives

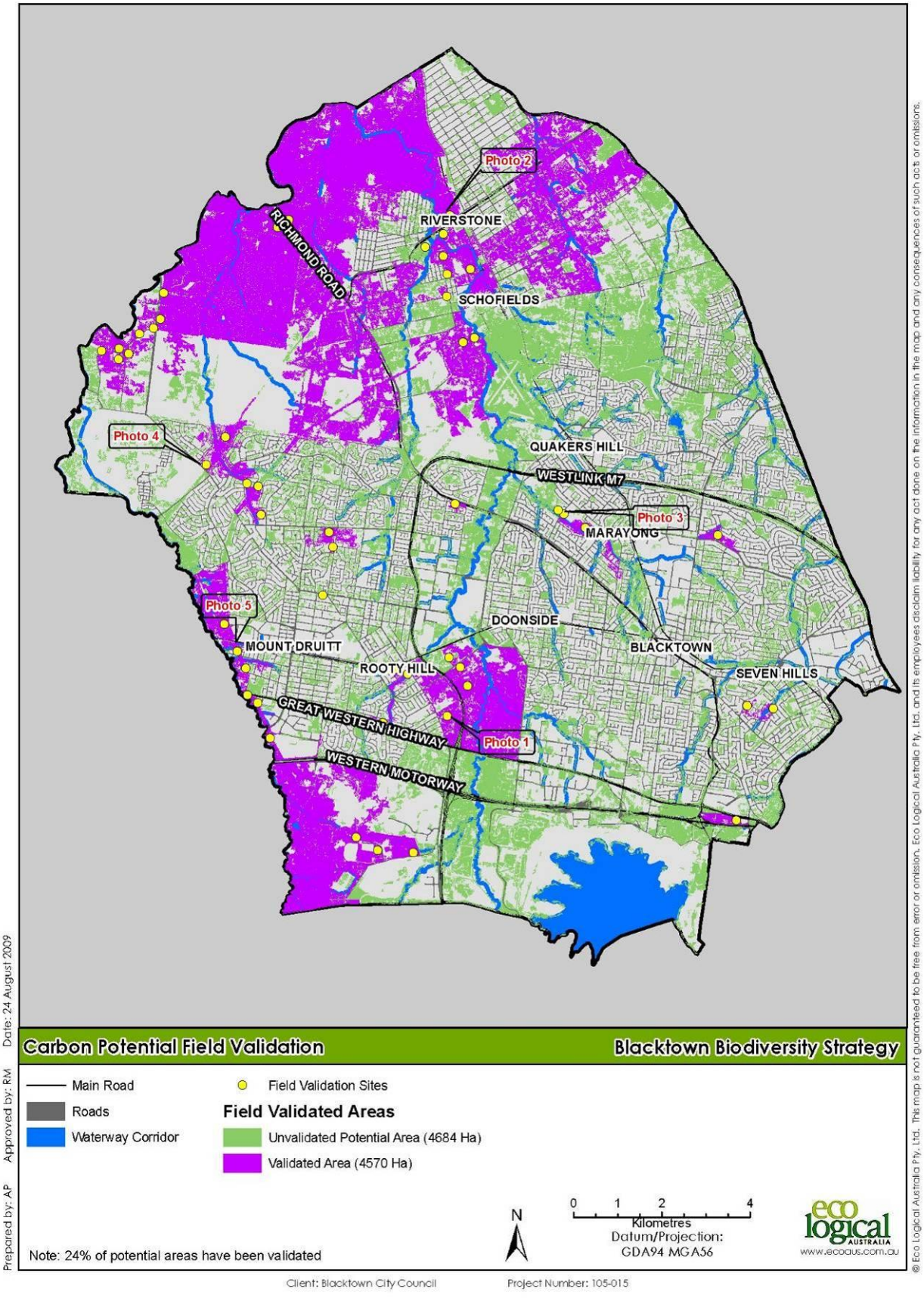

Figure G7: Carbon potential field validation locations

Appendix H: Weeds

Weeds of National Significance

- Alligator weed
- Athel pine
- Bitou bush / Boneseed
- Blackberry
- Bridal creeper
- Cabomba
- Chilean needle grass
- Gorse
- Hymenachne
- Lantana
- Mesquite
- Mimosa
- Parkinsonia
- Parthenium weed
- Pond apple
- Prickly acacia
- Rubber vine
- Salvinia
- Serrated tussock
- Willow

More information: Weeds of National Significance (www.environment.gov.au)

National Environmental Alert List Weeds

- Barleria
- Blue hound's tongue
- Cane needle grass
- Chinese rain tree
- Chinese violet
- Cutch tree
- Cyperus
- False yellowhead
- Garden geranium
- Heather
- Holly leaved senecio
- Horsetail species
- Karroo thorn
- Kochia
- Lagarosiphon

- Laurel clock vine
- Leaf cactus
- Lobed needle grass
- Orange hawkweed
- Praxelis
- Rosewood
- Senegal tea plant
- Siam weed
- Subterranean cape sedge
- Uruguayan rice grass
- White Spanish broom
- White weeping broom
- Yellow soldier

More information: National Environmental Alert List (www.environment.gov.au)

Noxious Weeds

The following table of noxious weeds declared for Blacktown LGA was taken from the Department of Primary Industries website (June 2009).

http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/noxweed

Control classes of noxious weeds are as follows:

Control class	Weed type	Example control requirements
Class 1	Plants that pose a potentially serious threat to primary production or the environment and are not present in the State or are present only to a limited extent	The plant must be eradicated from the land and the land must be kept free of the plant The weeds are also 'notifiable' and a range of restrictions on their sale and movement exist.
Class 2	Plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies and are not present in the region or are present only to a limited extent	The plant must be eradicated from the land and the land must be kept free of the plant The weeds are also 'notifiable' and a range of restrictions on their sale and movement exist
Class 3	Plants that pose a potentially serious threat to primary production or the environment of a region to which the order applies, are not widely distributed in the area and are likely to spread in the area or to another area	The plant must be fully and continuously suppressed and destroyed*
Class 4	Plants that pose a potentially serious threat to primary production, the environment or human health, are widely distributed in an area to which the order applies and are likely to spread in the area or to another area	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	Plants that are likely, by their sale or the sale of their seeds or movement within the State or an area of the State, to spread in the State or outside the State	There are no requirements to control existing plants of Class 5 weeds However, the weeds are 'notifiable' and a range of restrictions on their sale and movement exists

NOTE: All Class 1, 2 and 5 weeds are prohibited from sale in NSW.

* In some cases the following wording has also been inserted 'the plant may not be sold, propagated or knowingly distributed.'

Weed		Class
Scientific Name	**Common Name**	
Lycium ferocissimum	African boxthorn	4
Pennisetum macrourum	African feathergrass	5
Sisymbrium runcinatum	African turnipweed	5
Sisymbrium thellungii	African turnipweed	5
Alternanthera philoxeroides	Alligator weed	3
Eichhornia azurea	Anchored water hyacinth	1
Ambrosia artemisiifolia	Annual ragweed	5
Sagittaria montevidensis	Arrowhead	5
Cynara cardunculus	Artichoke thistle	5
Tamarix aphylla	Athel pine	5
Xanthium species	Bathurst/Noogoora/ Californian/cockle burrs	4
Festuca gautieri	Bear-skin fescue	5
Centaurea nigra	Black knapweed	1
Rubus fruticosus aggregate species	Blackberry (except cultivars Black satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smoothstem, Thornfree)	4
Asparagus asparagoides	Bridal creeper	5
Orobanche species	Broomrapes (includes all *Orobanche* species except the native *O. cernua* variety *australiana* and *O. minor*)	1
Ambrosia confertiflora	Burr ragweed	5
Cabomba caroliniana	Cabomba	5
Stachytarpheta cayennensis	Cayenne snakeweed	5
Nassella neesiana	Chilean needle grass	4
Asystasia gangetica subspecies micrantha	Chinese violet	1
Gaura parviflora	Clockweed	5
Xanthium specie	Cockle burrs	4

Sorghum x almum	Columbus grass	4
Sonchus arvensis	Corn sowthistle	5
Ageratina adenophora	Crofton weed	4
Cuscuta species	Dodder (includes All *Cuscuta* species except the native species *C. australis, C. tasmanica* and *C. victoriana*	5
Hygrophila polysperma	East Indian hygrophila	1
Achnatherum brachychaetum	Espartillo	5
Myriophyllum spicatum	Eurasian water milfoil	1
Cenchrus brownii	Fine-bristled burr grass	5
Pennisetum setaceum	Fountain grass	5
Cenchrus biflorus	Gallon's curse	5
Sporobolus fertilis	Giant Parramatta grass	3
Carthamus glaucus	Glaucous starthistle	5
Cuscuta campestris	Golden dodder	4
Scolymus hispanicus	Golden thistle	5
Cestrum parqui	Green cestrum	3
Harrisia species	Harrisia cactus	4
Hieracium species	Hawkweed	1
Equisetum species	Horsetail	1
Hygrophila costata	Hygrophila	2
Hymenachne amplexicaulis	Hymenachne	1
Echium species	Italian bugloss	4
Sorghum halepense	Johnson grass	4
Acacia karroo	Karoo thorn	1
Bassia scoparia	Kochia (except *Bassia scoparia subspecies trichophylla*)	1
Lagarosiphon major	Lagarosiphon	1
Lantana species	Lantana	5

Egeria densa	Leafy elodea	5
Ludwigia longifolia	Long-leaf willow primrose	3
Ludwigia longifolia	Long-leaf willow primrose	5
Ludwigia peruviana	Ludwigia	3
Nassella tenuissima	Mexican feather grass	1
Argemone mexicana	Mexican poppy	5
Miconia species	Miconia	1
Mimosa pigra	Mimosa	1
Cenchrus echinatus	Mossman River grass	5
Bryophyllum species and hybrids	Mother-of-millions	3
Romulea species	Onion grass (includes all *Romulea* species and varieties except *R. rosea var. australis*)	5
Oxalis species and varieties	Oxalis (includes all *Oxalis* species and varieties except the native species *O. chnoodes, O. exilis, O. perennans, O. radicosa, O. rubens,* and *O. thompsoniae*)	5
Cortaderia species	Pampas grass	3
Parthenium hysterophorus	Parthenium weed	1
Echium species	Paterson's curse, Vipers bugloss, Italian bugloss	4
Parietaria judaica	Pellitory	4
Annona glabra	Pond apple	1
Acacia nilotica	Prickly acacia	1
Cylindropuntia species	Prickly pear	4
Opuntia species except *O. ficus-indica*	Prickly pear	4
Ligustrum lucidum	Privet (Broad-leaf)	4
Ligustrum sinense	Privet (Narrow-leaf/Chinese)	4
Oryza rufipogon	Red rice	5
Toxicodendron succedaneum	Rhus tree	4
Cryptostegia grandiflora	Rubbervine	1

Sagittaria platyphylla	Sagittaria	5
Salvinia molesta	Salvinia	3
Avena strigosa	Sand oat	5
Gymnocoronis spilanthoides	Senegal tea plant	1
Nassella trichotoma	Serrated tussock	4
Chromolaena odorata	Siam weed	1
Brassica barrelieri subspecies oxyrrhina	Smooth-stemmed turnip	5
Picnomon acarna	Soldier thistle	5
Cenchrus incertus	Spiny burrgrass	4
Cenchrus longispinus	Spiny burrgrass	4
Centaurea maculosa	Spotted knapweed	1
Hypericum perforatum	St. John's wort	4
Helianthus ciliaris	Texas blueweed	5
Trapa species	Water caltrop	1
Eichhornia crassipes	Water hyacinth	3
Pistia stratiotes	Water lettuce	1
Stratiotes aloides	Water soldier	1
Salix species	Willows (includes all *Salix* species except *S. babylonica, S. x reichardtii, S. x calodendron*)	5
Striga species	Witchweed (includes all *Striga* species except native species and *Striga parviflora*)	1
Limnocharis flava	Yellow burrhead	1
Cyperus esculentus	Yellow nutgrass	5

Appendix I: Data Audit

Introduction

Eco Logical Australia has analysed and audited collated data for the purposes of developing comprehensive and up-to-date carbon, vegetation/biodiversity and aquatic weeds and rubbish mapping to support a Blacktown City Council Biodiversity Strategy. The audit has considered recent guidelines for Biodiversity Strategy criteria developed by DECC and has asked a number of questions as part of the methodology.

Study Area

The study area is focused on Blacktown City Council. Some issues, such as aquatic weeds and habitat corridors, are regional in scale and cross LGA boundaries.

Methods

Eco Logical Australia has analysed data provided by Council by viewing and interrogating the data in a GIS, where available, looking at:

- Spatial extent in regards to the study area (LGA or regional)
- Assessing the scale of the data (broad scale vs. site specific)
- Accuracy and completeness of spatial features and tabular attributes
- Assessing the currency of the dataset (whether it is up-to-date)
- Data license requirements
- Priorities and actions

Results of Information Review and Data Audit

Data required for use in the project is based on information to support the development of refined vegetation and biodiversity significance mapping, carbon sequestration opportunity mapping and aquatic weed and rubbish mapping within Blacktown LGA. The suite of data sets sought for the project is based on initial criteria for the development of these mapping products. Initial criteria include:

Carbon Mapping

- Lands cleared prior to 1990
- Lands planted/revegetated post-1989
- Land ownership and management
- Vegetation type and carbon sequestration opportunity
- Land use and planning framework
- Biodiversity and habitat opportunity
- Land surface (impervious and pervious surfaces)
- Landscape connectivity
- Recovery potential

Vegetation and Biodiversity Significance

- Biodiversity value - existing (known) and potential, habitat condition, threatened species, riparian values
- Landscape connectivity - local and regional corridors, distance from nearest habitat
- Future viability - local and regional, habitat patch size
- Threat or vulnerability - surrounding land use, rarity, overcleared landscapes
- Priority - legislative framework

Areas susceptible to Aquatic Weeds and Rubbish

- Known areas of aquatic weeds and rubbish dumping
- Severity of weed and dumping
- Potential pollution/rubbish sources - stormwater and adjacent land uses, zoning
- Public and private access and transport that may facilitate weeds and dumping
- Climatic conditions
- Weed and rubbish dispersal/transport/movement mechanisms
- Treatment information

A review of existing data identified the following data gaps:

- Uncertainties regarding resolution, completeness, accuracy and currency due to lack of metadata
- Spatial/tabular inaccuracies (e.g. waterways displayed offsets in places of up to 10 m when compared with contour data).
- Quality (e.g. some imagery was dark and difficult (slow) to use due to large file size and numbers of tiles)

Further detail of data gaps for each dataset is tabulated below in **Table I1**.

Table I1: Data audit results for Blacktown City Council Biodiversity Strategy including data currently obtained (at May 2009) as well as data identified for collection

Dataset Description	Source	Extent	Resolution	Complete	Currency (year)	Acquired	Custodian	Notes
Contours	BCC	LGA	0.5 m	Yes		Yes	BCC	
Lot parcel	BCC	LGA some possible gaps	1:5,000?	Yes	2009 Jan	Yes	BCC	Inaccuracies at creeks
Strata	BCC	LGA	1:5,000?	Yes	2009 Jan	Yes	BCC	
Reserve - acquired	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	Biodiversity mapping
Reserve - proposed	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	Biodiversity mapping
Reserve - registered	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	Biodiversity mapping
Road segment - acquired	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	Aquatic weeds and rubbish analysis
Road segment - proposed	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	Aquatic weeds and rubbish analysis
Road segment - registered	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	Aquatic weeds and rubbish analysis
Easements - proposed	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	Aquatic weeds and rubbish analysis
Easements - registered	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	Aquatic weeds and rubbish analysis
Boundaries - LGA	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	General use
Boundaries - suburb	BCC	LGA +	1:5,000?	Yes	Unknown	Yes	BCC	Context data
Boundaries - ward	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	Context data
Bushfire buffer	BCC	LGA	1:16,000	Unknown	Unknown	Yes	BCC	Biodiversity & carbon mapping
Bushfire buffer	BCC	LGA	1:16,000	Unknown	Unknown	Yes	BCC	Biodiversity & carbon mapping
Bushfire category	BCC	LGA	1:16,000	Unknown	Unknown	Yes	BCC	Biodiversity & carbon mapping

Dataset Description	Source	Extent	Resolution	Complete	Currency (year)	Acquired	Custodian	Notes
Creek catchment	BCC	LGA	1:25,000?	Yes	Unknown	Yes	BCC	Missing data, feature misalignments Biodiversity & carbon mapping
Creek sub-catchment	BCC	LGA	1:25,000?	Yes	Unknown	Yes	BCC	Missing data, feature misalignments Biodiversity & carbon mapping
Waterway	BCC	LGA +	1:25,000?	Potential Gaps	Unknown	Yes	BCC	Feature misalignments Biodiversity & carbon mapping
Cumberland Plain Vegetation	BCC	LGA	1:16,000	Yes	2002	Yes	DECC	Biodiversity & carbon mapping
REP area	BCC	LGA	1:5,000?	Yes	Unknown	Yes	DoP	Biodiversity & carbon mapping
REP annotation	BCC	LGA	N/A	Yes	Unknown	Yes	DoP	
SEPP annotation	BCC	LGA	N/A	Yes	Unknown	Yes	DoP	
SEPP area	BCC	LGA	1:5,000?	Yes	Unknown	Yes	DoP	
Environmental conservation	BCC	LGA	1:5,000?	Yes	Unknown	Yes	DoP	Growth Centres Biodiversity & carbon mapping
Public Rec - Local	BCC	LGA	1:5,000?	Yes	Unknown	Yes	DoP?	Growth Centres Biodiversity & carbon mapping
Public Rec - Regional	BCC	LGA	1:5,000?	Yes	Unknown	Yes	DoP?	Growth Centres Biodiversity & carbon mapping
Zoning	BCC	LGA w- gaps	1:5,000?	Yes	Unknown	Yes	BCC	Biodiversity, carbon, and aquatic weeds and rubbish mapping
Archaeologically significant areas	BCC	LGA	Unknown	Yes	Unknown	Yes	BCC	
Heritage	BCC	LGA	Unknown	Yes	Unknown	Yes	BCC	
Known archaeological sites areas	BCC	LGA	Unknown	Yes	Unknown	Yes	BCC	
Known archaeological sites pts	BCC	LGA	Unknown	Yes	Unknown	Yes	BCC	

Dataset Description	Source	Extent	Resolution	Complete	Currency (year)	Acquired	Custodian	Notes
Significant vegetation point locations	BCC	LGA	Unknown	Yes	Unknown	Yes	BCC	Biodiversity mapping
Community land	BCC	LGA	1:5,000?	Yes	Unknown	Yes	BCC	Biodiversity, carbon, and aquatic weeds and rubbish mapping
Flooding hazard - low	BCC	LGA	1:25000?	Yes	Unknown	Yes	BCC	Biodiversity, carbon, and aquatic weeds and rubbish mapping
Flooding hazard - medium	BCC	LGA	1:25000?	Yes	Unknown	Yes	BCC	Biodiversity, carbon, and aquatic weeds and rubbish mapping
Flooding hazard - high	BCC	LGA	Low: 1:25000?	Yes	Unknown	Yes	BCC	Biodiversity, carbon, and aquatic weeds and rubbish mapping
Cumberland Plain Priority Conservation Lands	DECC	Western Sydney	1:16,000 - 1:25,000	Yes	Oct-08	Yes	DECC	
Carbon mapping - land potential	ELA 2008	LGA	1:5,000 - 1:25 000	Yes	2008	Yes	BCC	Carbon mapping
Carbon mapping - veg potential	ELA 2008	LGA	1:5,000 - 1:25 000	Yes	2008	Yes	BCC	Carbon mapping
Carbon mapping - 20y potential	ELA 2008	LGA	1:5,000 - 1:25 000	Yes	2008	Yes	BCC	Carbon mapping
Climate		Greater Sydney	100 m	Yes	2001	Yes		BIOCLIM derived/modelled data – carbon mapping
Soil/landscape	DECC	LGA	1:100,000	Yes		Yes	DECC	Carbon mapping
Pre-1750 veg	DECC	Western Sydney	1:100,000	Yes	2000	Yes	DECC	Modelled data - biodiversity and carbon mapping
Geology	DPI	Western Sydney	1:250,000	Yes	?	Yes	DPI	Carbon mapping - very coarse data

Dataset Description	Source	Extent	Resolution	Complete	Currency (year)	Acquired	Custodian	Notes
Terrain	BCC	LGA		Yes	2008	Yes	BCC	LiDAR coverage refinement of vegetation structure mapping
Biodiversity Conservation Significance		LGA				Derived		Derive from criteria
Threatened Species - Flora	DECC	LGA	100 m - 1,000 m	Ongoing	Current	Yes	DECC	Biodiversity mapping - required
Threatened Species - Fauna	DECC	LGA	100 m - 1,000 m	Ongoing	Current	Yes	DECC	Biodiversity mapping - required
Regional habitat corridors	Derived	LGA				Derived		Derived regional corridors
Riparian assessment/classification mapping	DoP / DWE	Growth Centres	1:25,000	Yes	2006	Yes	DoP	Biodiversity mapping
Land use / land cover		LGA	1:8,000		2008	Derived		Derived for biodiversity and carbon mapping
Woody / non-woody 1990	BRS	LGA	20 m	Yes	1990	Yes	BRS	Carbon mapping - required
Pervious and impervious landscapes		LGA	1:8,000	No		Derived		Derived from LiDAR & imagery
Accessibility for rubbish dumping		LGA				Derived		Derive from criteria for aquatic weed and dumping mapping
Vegetation condition	Various					Yes		Biodiversity mapping - collation from previous survey information
Bank erosion	BCC State of Waterways	LGA		Yes	1995	Yes	BCC	Collected by BCC as part of State of Waterways Reporting. Database information - no spatial reference

Dataset Description	Source	Extent	Resolution	Complete	Currency (year)	Acquired	Custodian	Notes
Bed erosion	BCC State of Waterways	LGA		Yes	1995	Yes	BCC	Collected by BCC as part of State of Waterways Reporting. Database information - no spatial reference
Sedimentation	BCC State of Waterways	LGA		Yes	1995	Yes	BCC	Collected by BCC as part of State of Waterways Reporting. Database information - no spatial reference
In stream - noxious weeds present as classified under the Noxious Weeds Act 1993	BCC State of Waterways	LGA		Yes	1995	Yes	BCC	Collected by BCC as part of State of Waterways Reporting. Database information - no spatial reference
In stream - non-indigenous native flora occupies over 75% of the 50 m assessment site	BCC State of Waterways	LGA		Yes	1995	Yes	BCC	Collected by BCC as part of State of Waterways Reporting. Database information - no spatial reference
Riparian - noxious weeds present as classified under the Noxious Weeds Act 1993	BCC State of Waterways	LGA		Yes	1995	Yes	BCC	Collected by BCC as part of State of Waterways Reporting. Database information - no spatial reference
Riparian - non-indigenous native flora occupies over 75% of the 50 m assessment site	BCC State of Waterways	LGA		Yes	1995	Yes	BCC	Collected by BCC as part of State of Waterways Reporting. Database information - no spatial reference
Estimated pollution rates: Nitrogen, Phosphorus, suspended solids. Based on surrounding land use	BCC State of Waterways	LGA		Yes	1995	Yes	BCC	Collected by BCC as part of State of Waterways Reporting. Database information. Aquatic weeds & rubbish mapping. Qualitative value of stream reach only (H/M/L)

Dataset Description	Source	Extent	Resolution	Complete	Currency (year)	Acquired	Custodian	Notes
IMAGERY								
Aerial photos - 2008	BCC	LGA	10 cm	Complete	2008	Yes	BCC	Very large file size & large numbers of tiles - image quality is dark when viewed through GIS Refinement of extant vegetation mapping
1989/1990 Landsat TM5	USGS					Yes	USGS	Carbon mapping - derivation of historical land clearing
1988 Aerial photography	BCC	LGA			1988	Yes	BCC	Not orthorectified

Appendix J: Blacktown LGA biodiversity report card

This 'report card' summarises conditions relating to the physical environment and biodiversity within Blacktown LGA in 2010. This report card could be updated by Council every two years. Information provided in the report card is dependent on results of ecological monitoring.

- 225 named and 446 unnamed registered reserves
- 1,465 Ha total area of registered reserves
- 2,229.7 Ha total area of extant vegetation communities in the LGA
- 398.2 Ha total area of extant vegetation communities under care, control or management of Council
- 7 endangered ecological communities (including one critically endangered ecological community)
- 17 threatened flora species
- 1 threatened flora population
- 3 threatened amphibian species
- 17 threatened bird species (plus 11 migratory species)
- 1 threatened gastropod species
- 13 threatened mammal species
- 1 threatened reptile species
- 2 threatened fish species
- Almost 100 weed species

Appendix K: Framework for a decision support tool to prioritise on-ground works

The framework for a decision support tool is provided below to determine priorities and actions for on-ground works.

1. Refer to existing Plans of Management for Council's parks and reserves
2. Refer to the map of biosequestration opportunities (**Figure 17)** to determine if the location of the site relevant to the Plan of Management has a high priority for potential carbon sequestration in accordance with the Kyoto Protocol (and possibly subsequent BioBanking)
3. Refer to the map of potential biodiversity corridors (**Figure 14)** to check if the location of the site relevant to the Plan of Management has a high priority for potential biodiversity enhancement. Consider conservation significance assessment, connectivity, patch size, condition and current management regime
4. Conduct a site visit
5. Consider the results of Steps 2 to 4 to decide the objectives for the site (e.g. should areas within the site preference carbon sequestration or biodiversity treatment)
6. Update the Plan of Management to reflect site objectives, site conditions and provide details for on-ground works
7. The updated Plan of Management should address statutory criteria and other criteria, including:
    - Land title
    - Land use and zoning, e.g. E2 zone or environmentally sensitive land
    - Easements
    - Drainage channel
    - Maintenance requirements
    - Heritage
    - Sport and recreation
    - Agency requirements, e.g. Sydney Water and Rural Fire Service
    - Threats, especially for relevant threatened species, populations and communities
    - Priority actions identified by DECCW
    - Preference for BioBanking and/or carbon trading
8. Repeat Steps 2 to 7 for council reserves that do not have an existing Plan of Management; results should be presented in a Plan of Management
9. Repeat Steps 2 to 7 for other areas with potential for biosequestration (**Figure 17).** Private landowners could be encouraged to participate through the Regenesis program

Appendix L: Birds & other wildlife recorded in Blacktown LGA

The following report was prepared by Edwin Vella of the Cumberland Bird Observers Club.

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