

# Biodiversity Management Plan Erskine Park Employment Area

2 May 2006

Prepared for:

**CSR**

Locked bag 6

Chatswood NSW 2057

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Biodiversity Management Plan  
Erskine Park Employment Area  
2 May 2006

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By

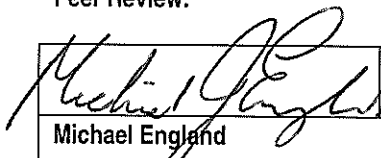
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- Appendix A Biodiversity Restoration and Implementation Plan for Erskine Park Release Area (Greening Australia NSW)
- Appendix B Biodiversity and Conservation Strategy: 2005 (HLA-Envirosciences Pty Ltd)
- Appendix C Restrictive Covenant for Biodiversity

# 1 INTRODUCTION

HLA-Envirosciences Pty Ltd (HLA) was engaged by CSR on behalf of the landowners of the Erskine Park Employment Area (EPEA) to develop a Biodiversity Management Plan (BMP) for the EPEA. This BMP centres upon the development and maintenance of a biodiversity corridor within the EPEA. This concept was developed in the Biodiversity Strategy prepared by HLA on behalf of the Erskine Park Landowners Group (EPLOG), and later endorsed in principle by Penrith City Council (Council) and Department of Environment and Conservation (DEC).

The EPLOG comprise the following landowners:

- CSR;
- The Austral Tile Company (Austral);
- Fitzpatrick Investments Pty Ltd (Fitzpatrick);
- ING Pty Ltd (ING); and
- Trust Company of Australia Ltd

A Biodiversity Restoration Plan (BRP) was prepared by Greening Australia NSW (GANSW) on behalf of EPLOG, which details the requirements for delivery of the works within the Biodiversity and Conservation Corridor (the corridor) and is intended to be read in conjunction with this BMP (**Appendix A**).

## 2 BACKGROUND

### 2.1 History of the Biodiversity Strategy 2005

In May 2004, Premier Bob Carr addressed the Sydney Futures Forum on the topic of population and employment growth in Western Sydney. Mr Carr announced the government's intentions to increase the amount of land set aside for employment zones under State Environmental Planning Policy 59. This included the Ropes Creek area and proposed link road between the EPEA and strategically located M4 and M7 Motorways, both major access points to Western Sydney's road transport system. Mr Carr acknowledged the success of the development of employment areas in the greater west as a means to service the increasing population growth in this region, as well as the importance of environmental management.

The EPEA is part of the State Governments Employment Lands Development Program, which heralds significant opportunities for the provision of employment in Western Sydney. A report by BIS Shrapnel (August 2003)<sup>1</sup> identified the potential for generation of over 26,600 annual full time equivalent jobs over the next 10-15 years. The EPEA comprises a significant portion of this, with approximately 500 hectares residing within the Penrith local government area (LGA).

The Biodiversity Strategy 2005 (the Strategy) was developed in order to provide a strategic framework for the conservation of biodiversity within the EPEA (**Appendix B**). It included information on models for the ownership, funding and management/maintenance arrangements for the conservation of biodiversity values at EPEA and surrounding areas identified in the Strategy. The Strategy also provided a basis for review and amendment of aspects of the Development Control Plan (DCP) and other relevant planning instruments and development control documents, as they relate to biodiversity conservation.

The Strategy is now superseded by the Biodiversity Management Plan (BMP) which contains more accurate and up to date information on the implementation of the biodiversity principles outlined in the Strategy.

### 2.2 Previous Studies

Council commissioned Biosis Research in 1999 to undertake an environmental study of the EPEA with the purpose of identifying biodiversity limitations that may apply to the future development of the EPEA, and recommending areas for conservation. The result of the Biosis Report was that of the some 500 ha of the EPEA, only 257 ha of developable lands were available. Council adopted its DCP for the EPEA in 2002 partially based on the recommendations of the Biosis Report.

Since the preparation of the Biosis Report and DCP, several environmental studies and ecological surveys have been undertaken in consultation with Council. These studies, including a report by Kevin Mills and Associates in 2003 have highlighted limitations with the original Biosis Report and consequently the biodiversity strategy within the DCP. These include:

- ground truthing has revealed that *Hypsela* is not present on the Austral land as was previously assumed by the Biosis Report and consequently the DCP;
- the lack of consideration for broader off site conservation opportunities (i.e. the potential to develop the east-west corridor between South Creek and Ropes Creek and link it to the EPEA);

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<sup>1</sup> BIS Shrapnel Pty Ltd 2003 *Economic Assessment of Erskine Park Employment Area* (prepared for EPLOG).

- the ownership, funding and overall management responsibilities of biodiversity conservation within the EPEA; and
- the need for better integration of biodiversity conservation and development in order to protect key ecological features while also facilitating development of the EPEA.

In the first Western Sydney Regional State of the Environment Report 2000, published in 2002 by the Western Sydney Regional Organisation of Councils (WSROC), it was stated that only 26 percent of the original cover of Cumberland Plain Woodland remained, with approximately 10,000 ha of high quality vegetation remaining in Penrith LGA. The Biosis Report noted that the viability of this vegetation was compromised due to the small, fragmented nature of remnants and the cumulative impacts of local development.

Habitat loss and fragmentation pose significant threats to biodiversity conservation. Improvement of habitat connectivity by way of habitat corridors is recognised as one way to mitigate the adverse effects of fragmentation. Soule and Gilpin (1991)<sup>2</sup> defined a corridor as “a two dimensional landscape element that connects two or more patches of habitat that have been connected in historical time...”. However the linear nature of corridors may result in susceptibility to threats such as invasion from exotic species and alteration of microclimate.

MacDonald, M.A. (2003)<sup>3</sup> noted that the design of environmental corridors needed to be sensitive to environmental contours and ensure habitat continuity, as well as have sufficient riparian margins to maintain the structurally diverse ecological communities. The success of corridors is also dependent on vegetation type, corridor dimensions and geographical location. In addition, corridors should be complemented by additional conservation measures such as establishment and maintenance management practices, ownership and biodiversity considerations.

## 2.3 The Biodiversity Strategy: 2005

The Strategy provides for the development of a biodiversity corridor to link the Ropes Creek and South Creek catchments and also provides linkages between the Defence site at Orchard Hills, the South Creek riparian corridor, the ADI site in the north, Ropes Creek riparian corridor and Eastern Creek riparian corridor. The areas linked by the corridor are depicted on **Figure 1**. The corridor will enable the protection of key ecological features, including:

- the riparian corridor around Ropes Creek and South Creek within and around the EPEA;
- remnant ecological communities of the Cumberland Plain Woodland and Sydney Coastal River-Flat Forest; and
- endemic flora and fauna habitats of the Cumberland Plain.

The Biodiversity Strategy places particular emphasis upon these remnant ecological communities and proposes to include concentrations of viable communities within the corridor.

The biodiversity corridor will be developed in two phases:

- Phase One: Establishment and Restoration; and
- Phase Two: Ongoing Maintenance.

The initial development and revegetation of the corridor will occur over the next five years, and this establishment and restoration activity constitutes Phase One of corridor development.

<sup>2</sup> Soule, M.E. and Gilpin, M.E. (1991). The theory of wildlife corridor capability. *Nature Conservation 2: The role of Corridors* (eds D.A. Saunders and R.J. Hobbs), Beatty and Sons, Chipping Norton.

<sup>3</sup> MacDonald, M.A. (2003). The role of corridors in Biodiversity conservation in production forest landscapes: A literature review, in *Tasforests* Vol. 14.

Phase Two involves maintenance and ongoing works such as weed management, pest control, protective fencing and maintenance of access restrictions, and will continue in perpetuity.

The Biodiversity Strategy received in-principle support from the Department of Environment and Conservation (DEC), subject to the resolution of some detailed matters identified for inclusion in the BMP, including:

- the exact boundary of the biodiversity corridor, the area of Crown Road to be included in the corridor;
- specifications for the proposed offset ratios of 3.5:1 for revegetation offset and 6:1 for the overall conservation area;
- ownership, management and funding arrangements; and
- specific on ground revegetation proposals for the biodiversity corridor.

This BMP is intended to guide implementation of the Strategy and the Biodiversity Restoration and Implementation Plan (BRIP) prepared by GANSW. These documents are provided in their entirety in **Appendix B** and **A** respectively. This BMP will enable delivery of a revegetated corridor that creates a link between sites of ecological significance in order to mitigate the effects of fragmentation on key ecological features, specifically the Cumberland Plain Woodland and Sydney Coastal River-Flat Forest.

Further to the allocation of land for the biodiversity corridor, revegetation and compensatory habitat form the basis for creating an ecological mosaic integrated with other land uses to allow both development and conservation opportunities achieving greater sustainability outcomes. This provides continuity of biodiversity values rather than the retention of fragmented ecological communities which pose a threat to the integrity of biodiversity values. The inclusion of compensatory habitat allows for revegetation of areas within the corridor to account for losses during construction within the EPEA.

## 2.4 Principles of the Strategy

The Strategy is based on several key principles as follows:

- that a contiguous biodiversity corridor be established, both within the EPEA and in the surrounding land, providing an east-west link between South Creek and Ropes Creek, comprising sufficient representative biodiversity values;
- access to the biodiversity corridor should be restricted or managed. It is recommended that access be managed to provide access to among others, the owners of the corridor, their agents, the organisation undertaking the restoration and emergency services;
- to ensure consistency and continuity of management, it is proposed that the corridor be held in single ownership;
- to provide certainty with respect to the biodiversity outcome it is recommended that one organisation, such as Greening Australia, be engaged at establishment and in perpetuity to undertake restoration and maintenance works within the corridor; and
- funding of all stages of corridor development and on going biodiversity conservation be guaranteed at the outset of the restoration project.

## 2.5 Support for the Strategy

The Biodiversity Strategy was distributed to all relevant agencies including Council, the Department of Infrastructure Planning and Natural Resources (now Department of Planning), the DEC and the Commonwealth Department of the Environment and Heritage. The principles

outlined in the Biodiversity Strategy have received support from the relevant agencies; however as noted previously the support of DEC is conditional on a number of matters being resolved within the BMP. Specifically these are:

- the final boundary of the biodiversity conservation area;
- revegetation and conservation offset ratios; and
- ownership, funding and management arrangements.

The resolution of these matters is addressed in this BMP. The DEC also supports the BRIP prepared by GANSW on behalf of the EPLOG, which outlines work required to deliver the conservation values of the Strategy and the BMP.



## 3 BIODIVERSITY AND CONSERVATION CORRIDOR

### 3.1 Final Boundaries of the Biodiversity Corridor

In response to discussions between the EPLOG and DEC, DOP and Council some minor adjustments have been made to the biodiversity corridor. In particular additional land to the west of the EPEA has been included in the corridor to compensate for the removal of the Enviroguard site (Area 6a) from the corridor calculations. The final boundary of the biodiversity corridor is shown in **Figure 1**. It should be noted that while the Enviroguard site has been removed from the calculations of the corridor land area, it is still represented in **Figure 1** as forming part of the biodiversity corridor. While planting within the Enviroguard site will be limited following decommissioning of the quarry in 2014, it will nevertheless contribute to the biodiversity values of the corridor and offers a contiguous link between adjacent tracts of the biodiversity corridor.

### 3.2 Revegetation and Conservation Offset Ratios

Conservation or “Green” offsets have been used as a mitigation measure for the protection of biodiversity and ecological values. An offset can be defined as an action that is taken outside a development site that reduces the impact of that development. Green offsets have been typically used in instances where development results in unavoidable impacts, and are seen as a way of reconciling development pressures and environmental protection.

In the case of the EPEA, the principle of green offsets underpins the agreed Biodiversity Strategy and the creation of the Biodiversity and Conservation Corridor. The corridor provides a mitigation opportunity that both facilitates the development of the EPEA as employment lands in accordance with the NSW Metropolitan Strategy and provides for the protection of the biodiversity and ecological values within the EPEA and surrounding area.

Following discussions between the EPLOG and DEC an agreement was reached that an appropriate revegetation offset and overall conservation area target for the development of the EPEA is 3.5:1 and 6:1, respectively. The DEC considers the offset ratio proposed to be appropriate considering the unique planning circumstances at the EPEA site. In addition these targets are consistent with other examples where revegetation offsets have been used as part of a package of mitigation measures for developments including road projects.

**Table 1**, supported by **Figure 1**, shows the final calculations of the revegetation offset and conservation area ratios for the EPEA:

**Table 1: Revegetation offset and conservation ratios for Biodiversity Corridor**

Revegetation Offset and Conservation Ratios	Revegetation Offset and Conservation Targets	Actual Calculations
total corridor area : cleared area within EPEA	6.0 : 1.0	Total corridor area (211.0 ha) : cleared area (34.3 ha) = 6.15 :1
total revegetation area in corridor : cleared area within EPEA	3.5 : 1.0	Total revegetation area (120.1 ha) : cleared area (34.3 ha) = 3.5 : 1

### 3.3 Ownership

In accordance with the principles of the Strategy as set out in **Section 2.4** of this BMP, public ownership of the corridor by a single entity has been determined as the most appropriate model for the corridor.

The DOP has agreed to accept ownership of the biodiversity corridor lands. This will occur through a development process whereby areas of the biodiversity corridor will be subdivided from the adjoining developable land to create a separable parcel with a new certificate of title which may then be transferred to DOP, or a related entity or corporation. Ownership transfer would occur prior to an occupancy certificate or equivalent being issued for the development of the adjoining parcel of land. However prior to development and transfer, biodiversity corridor land will be protected by each landowner through a restrictive covenant on the title of the land, the same or similar as terms of the restrictive covenant for biodiversity attached as **Appendix C**.

While the corridor will comprise multiple lots, it will be managed as a single entity, owned by DOP, and maintained by GANSW, subject to DOP approval.

Biodiversity corridor land owned by Council and Sydney Catchment Authority (SCA) will remain in its current ownership, however access agreements have been established to enable GANSW to enter these areas for the purposes of revegetation and maintenance works, subject to approval from DOP.

The legal mechanisms for establishment and long term management of the biodiversity and conservation corridor at Erskine Park are outlined in a suite of formal agreements between the EPLOG, DOP and GANSW. These documents include:

- Landowners' Agreement: Parties to this agreement are CSR, Austral, Fitzpatrick, ING and Trust Company of Australia Ltd;
- Biodiversity and Conservation Agreement: Parties to this agreement are DOP, SCA, Council, CSR, Austral, Fitzpatrick, ING and Trust Company of Australia Ltd;
- Landowners Agreement with DOP: Parties to this agreement are DOP, CSR, Austral, Fitzpatrick, ING and Trust Company of Australia Ltd;
- General Agreement with Greening Australia: Parties to this agreement are GANSW, DOP, Council, SCA, CSR, Austral, Fitzpatrick, ING and Trust Company of Australia Ltd.

The agreements address the following aspects:

- transfer of the land between the landowners and DOP;
- long term ownership of the land;
- funding for the long term management of the land;
- development of Conservation Agreements under the *National Parks and Wildlife Act 1974*;
- the timing associated with the various components;
- access to the corridor for planting and maintenance; and
- future use of biodiversity corridor for passive recreation/educational use, compatible with biodiversity objectives.

The General Agreement allows for access to all biodiversity corridor land by GANSW to allow Phase One works to begin while the land is still under private ownership.

### 3.4 Funding

As detailed in the Landowners Agreement with the DOP, the relevant landowners have agreed to wholly fund the works identified in GANSW's BRIP (**Appendix B**). A lump sum contribution of \$3.0M will fund Phase One works on the biodiversity corridor, including establishment and maintenance between 2006 and 2009.

Phase Two works will be funded by a one off payment by the EPLOG to DOP as the long term owner of the biodiversity corridor. A sinking fund of \$1.0M has been agreed to provide for the future maintenance of the biodiversity corridor in perpetuity after 2009.

The initial lump sum contribution will cover the cost associated with (but not limited to) work carried out by GANSW, including:

- seed collection, propagation, planting and database management;
- the propagation of native local plant material;
- protective fencing and pest control; and
- primary weed control.

In addition to the above funding, a licence fee of \$0.5M will be paid to DOP to allow the EPLOG, and their agents, access to DOP land for planting, restoration and maintenance to the east and west of the EPEA.

A comprehensive table of restoration and maintenance activities and their associated costs are provided in Appendix 3 of the BRIP (refer **Appendix B** of this BMP).

## 4 RESTORATION AND IMPLEMENTATION PLAN

### 4.1 Overview

The BRIP prepared by Greening Australia for the Erskine Park Release Area has been employed as the mechanism to implement on ground works for the establishment and ongoing maintenance of the biodiversity corridor (refer **Appendix B** of this BMP). The BRIP describes the detail required to deliver the Biodiversity Strategy. The aim of the BRIP is to:

- Describe the site and vegetation characteristics of the EPEA (including biodiversity areas within and outside EPEA);
- Detail the restoration activities necessary to restore native vegetation;
- Detail the initial establishment and maintenance programs to be carried out in perpetuity;
- Outline costing for vegetation restoration; and
- Establish a community engagement program.

The BRIP has been prepared in accordance with provisions in relevant legislation and policy guidelines. Project facilitation will be carried out by GANSW.

### 4.2 Site Details

The EPEA contains three vegetation communities listed as endangered under the *Threatened Species Conservation Act 1995* (TSC Act), these being Sydney Coastal River Flat Forest (SCRFF), Shale Plains Woodland (SPW) and Shale Hills Woodland (SHW). Only species from SCRFF and SPW will be used in revegetation activities, with the patch of SHW included in the bush regeneration program proposed in Zone 2d. Detailed descriptions of these vegetation communities are provided in **Appendix B**

#### ***Sydney Coastal River Flat Forest***

SCRFF communities can be found along the riparian zone of Ropes Creek and scattered across several smaller drainage lines throughout the site. The community also exists along the small creek in the DOP land to the west of the site, leading down to the junction with South Creek.

In general, the SCRFF communities are partially infested with weeds but show signs of natural resilience. The riparian zones of the DOP, South Creek and Ropes Creek corridors are by far the most heavily infested and will require a comprehensive bush regeneration and weed control program. The majority of the SCRFF within the EPEA appears to be regrowth forest of approximately 40 years of age with the dominant species being *Casuarina glauca*. Significant remnant trees of *Angophora floribunda* still exist along the riparian zone of Ropes Creek, Zone 4a.

A schedule outlining the flora species and densities to be used in the restoration program for this vegetation community are provided in **Appendix B**.

#### ***Shale Plains Woodland***

Outside the riparian zones and drainage lines, the vegetation fades into SPW, usually associated with the small ridge lines across the site.

The SPW is generally in good condition, with weed infestation restricted to edges and pockets of annual and perennial weeds. Dominant canopy species are *Eucalyptus tereticornis*, *E. crebra* and *E. moluccana*. All SPW areas show high natural resilience and usually have a

comprehensive native grass layer dominated by *Aristita roma*. Other grasses recorded included *Danthonia sp.*, *Themeda sp.*, *Microlaena sp.* and *Cymbopogon sp.* The understorey is in good condition with patches of *Bursaria sp.*, *Dillwynia sp.*, *Grevillea juniperina* and *Davesia sp.* all regenerating well. The removal of stock from the site will further accelerate the processes of natural regeneration. The majority of SPW is regrowth vegetation approximately 40 years of age with some very significant remnant trees. There are several large trees in Zone 2d.

A schedule outlining the flora species and densities to be used in the restoration program for this vegetation community are provided in **Appendix A**.

#### **Shale Hills Woodland**

SHW is restricted to a small patch of remnant in Zone 2d. This patch is in excellent condition, with only minor infestation of annual and perennial weeds. The canopy is dominated by *E. crebra* and *E. moluccana*. Its outstanding feature is that it contains one of the largest *Melaleuca decora* trees on the Cumberland Plain. The understorey is in good condition with dense patches of *Bursaria sp.* and *Dillwynia sp.* occurring. The groundcover is dominated by *Aristita roma* with a mixture of *Themeda sp.*, *Danthonia sp.* and *Cymbopogon sp.*

### 4.3 Project Facilitation

The implementation of on ground works as part of the BRIP requires a detailed establishment and maintenance program. GANSW will carry out these works in accordance with provisions in relevant policy and legislation guidelines. The process of implementation will follow the steps outlined below:

- Application for Section 132C Licence: restoration and seed collection activities will require a Section 132C Licence administered by the DEC due to some vegetation being listed as Endangered Ecological Communities (EEC);
- Site preparation: program of works including soil preparation, fencing, rubbish collection and weed control;
- Preparation of seed management plan : seed collection, selection and techniques;
- Planting: program of works , planting design, planting techniques; and
- Maintenance regime: weed and pest control, protective fencing and access, rubbish removal and general repairs.

#### **Project Management**

Project Management will occur on two separate levels. The first will involve liaison with relevant organisations and agencies, setting the strategic direction and coordination of the project and ensuring all organisations are working to achieve the strategy outcomes.

The next level of Project Management will be to coordinate GANSW staff, sub contractors and community to achieve the project targets as determined by the BRIP.

Project Management will include client liaison, necessary reporting, communication with relevant government agencies, co-ordinating the community engagement program, invoicing and co-ordination within the entire delivery team.

#### **Project Reporting**

All works performed will be recorded on monthly templates and held by GANSW. These templates will form the basis of an annual reporting process to be provided to DOP, the EPLOG,

DEC, and Council. This process would continue throughout the life of the project. Included in the annual review would be a summary of the following aspects:

- the works completed each year;
- the progress of the anticipated implementation plan;
- monitoring and evaluation of previous works;
- a summary of community engagement activities;
- information relating to the seed bank;
- a photographic library; and
- other information of interest.

### ***Opportunities for Community Engagement and Education***

The restoration program provides numerous opportunities for community engagement, education and feature events. The feature events would be staged in conjunction with significant environmental dates such as Planet Ark's 'plant a tree day'.

The ultimate aim of the program is to set up a self sustaining Bushcare/ Landcare Group, working in conjunction with GANSW, taking 'ownership' and setting directions for the management of their local bushland.

GANSW recommends the following community activities:

- delivery of a community training program;
- community events targeting restoration activities;
- recreational activities allowing the community to enjoy the natural bushland;
- formation of a Bushcare/ Landcare Group; and
- an interactive community engagement program with DIPNR 'open space corridors'.

GANSW recommends the following timetable for the community activities:

Spring 2006	Seed collection and training
Autumn 2007	Tree planting event
Spring 2007	Guided walk and bush regeneration
Winter 2008	A Plant a tree day
Autumn 2008	Tree planting event

## **4.4 Restoration Activities**

There are 18 areas that will be subject to restoration activities under the BRIP. The following is a brief outline of restoration works to be carried out by GANSW. These activities are provided in full in the BRIP **Appendix B**.

### ***Preparation of Vegetation Management Plans (VMP)***

The proposed development will trigger the *Rivers and Foreshores Improvement Act 1948*. This Act sets clear parameters for restoring natural drainage lines and waterways and is administered by Department of Natural Resources (DNR) . For restoration occurring along natural drainage lines and waterways, VMPs will need to be prepared to the standards and guidelines set out by DNR (formerly DIPNR) and submitted with a 3A permit application for

assessment by DNR. All existing VMPs have been incorporated in the BRIP. For areas subject to 3A Permit works, a report must be submitted to DNR at Practical Completion (when all plants are installed), followed by six-monthly reports throughout the 2-year maintenance period.

### ***Revegetation***

Revegetation refers to the planting of tube stock or similar grown from local provenance seed to re-establish vegetation. This will include:

- Mechanical Planting – areas on site where revegetation will be undertaken using the ‘Treeliner’ mechanical planter.
- Installations of Native Tube Stock by Hand – plants are installed by hand into a planting hole excavated by hand tools or mechanical auger. The plant is placed in the hole and then backfilled with excavated site soil and firmly tamped down by hand and foot.
- Infill Planting and Replacement Planting – this is the practice of scattering plantings throughout areas of remnant trees that have undergone bush regeneration activities, or replacing plants which have died during the maintenance period.
- Hand Broadcasting of Native Seed – hand broadcasting of native grass seed is proposed throughout the maintenance period of the restoration program where revegetation activities focus on the establishment of native trees, shrubs and lower storey species.
- Direct Seeding – the delivery of native seeds into the soil using a mechanical seeder. Direct seeding activities will break up the appearance of revegetation in rows, providing a more natural landscape.
- T-Tape Installation – T-Tape irrigation system underneath can be installed under the soil throughout the riparian restoration areas where it is required.

GANSW will carry out maintenance of revegetated sites including:

- Watering of revegetated areas;
- Primary weed control including the treatment of noxious weeds and maintenance spraying of trees to control weed infestation;
- Hydro Mulching in areas with exposed topsoil or potential for erosion and installation of biodegradable jute matting on steep slopes; and
- General maintenance throughout the first two year period including repairing damaged tree guards, monitoring survival rates and installing replacement plants.

### ***Bush Regeneration and Weed Control***

Bush regeneration refers to techniques used to assist and promote natural regeneration without utilising plant material propagated in nurseries. Bush regeneration falls into three stages, specifically:

Primary Bush Regeneration - weeding through an area for the first time only. It may involve target weeding of selected species or a thorough weeding of all invasive species.

Secondary Bush Regeneration - This is usually carried out 3 – 6 months after primary weeding.

Follow up Bush Regeneration - Subsequent weeding sessions are determined by site conditions, such as the type of weeds present or the level of infestation and degradation. Follow up weeding is usually carried out for several years.

### ***Rubbish Removal and Minor Soil Works***

GANSW proposes to remove the piles of miscellaneous rubbish scattered throughout the open space of Ropes Creek using a Bobcat and Tipper. The areas disturbed during this operation will be re-graded, have native grass seed broadcast over them and then covered in brush matting. The brush matting will be supplied from the bush regeneration works during the removal of woody weeds.

A summary of activities required in each area and a diagram of areas that will undergo revegetation and bush regeneration is provided in the BRIP in **Appendix B**.

A diagram is provided in Appendix 2 of the BRIP (**Appendix B** of this BMP) showing the areas that will undergo revegetation and the areas that will undergo bush regeneration.

## **4.5 Estimated Program of Works**

Seed collection activities have already commenced in order to supply the revegetation and direct seeding activities with appropriate provenance seed. Restoration activities will focus upon revegetation from mid-March/April 2006 until May 2007. Revegetation will occur in Zones 1a, 1b, 1c and 2a in March/April 2006, and the DOP corridors in September/October 2006. Revegetation would then continue throughout the site until completed with all revegetation areas subject to an appropriate 2 year maintenance program.

Bush regeneration and weed control will commence from July 2006 and continue until completion of the program in 2010.

Zone 6a and 6b will be rehabilitated upon decommissioning of the landfill and former quarry and its associated activities in 2014.

Appendix 3 of the BRIP (**Appendix B**) provides a *Project Implementation Gantt Chart* showing the timetable for project implementation.





## FIGURES

NOTES: CONSULT WITH ALL APPLICABLE REGULATORY AGENCIES AND AGENCIES WITH JURISDICTION OVER THE PROJECT AND THE PROPOSED DEVELOPMENT. THE INFORMATION CONTAINED HEREIN IS FOR INFORMATIONAL PURPOSES ONLY AND DOES NOT CONSTITUTE A CONTRACT. THE CLIENT IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES. THE CLIENT IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES. THE CLIENT IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS FROM THE APPROPRIATE AGENCIES.

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PROJECT LOCATION  
 CSR SITE  
 LENORE LANE AND MAHRE ROAD  
 ERSKINE PARK

PROPOSED BIODIVERSITY AREAS

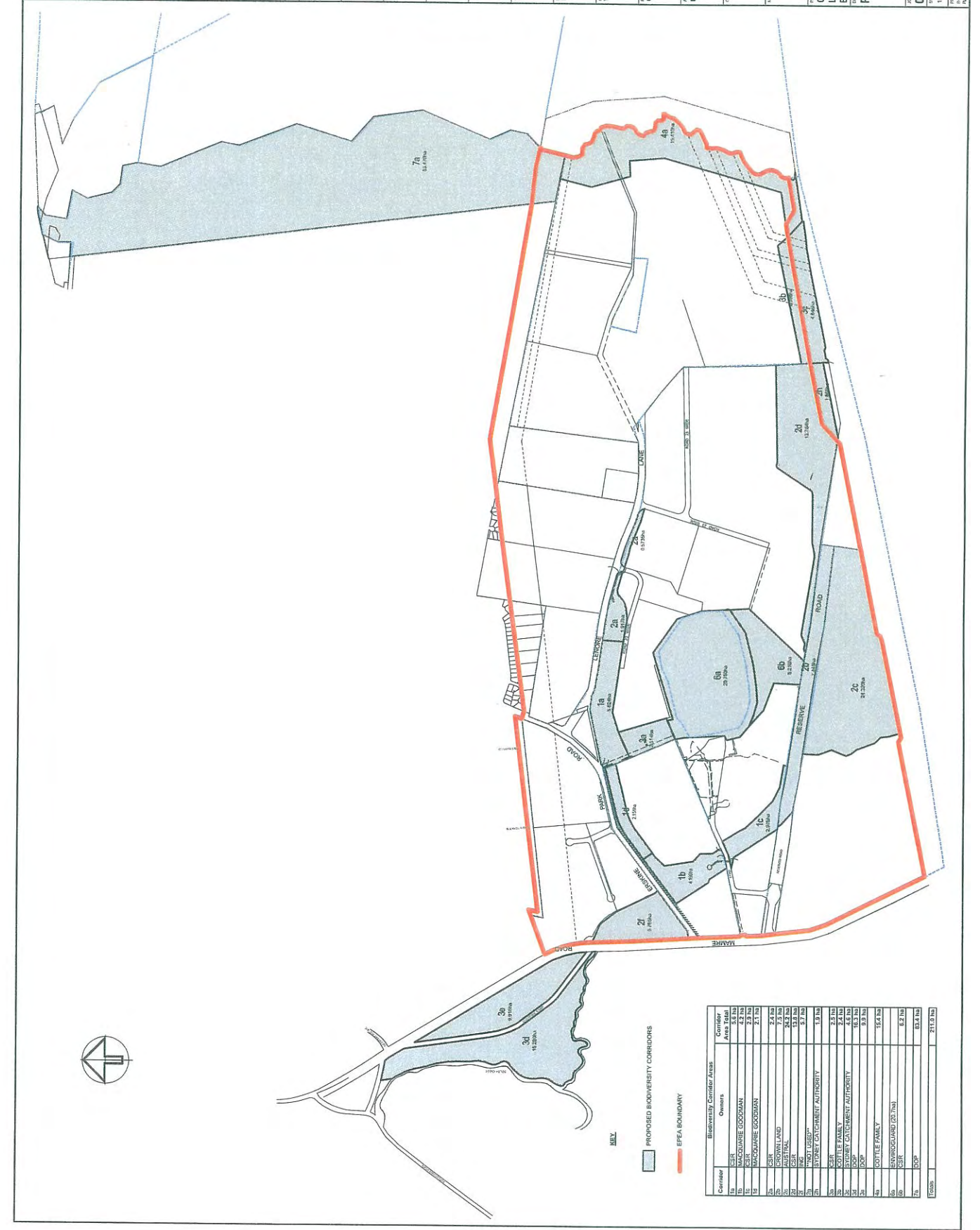
PROJECT NUMBER: ST-01  
 SCALE: 1:7500 @ A1  
 DATE: 15/08/2011

PROJECT NAME: CSR SITE  
 LENORE LANE AND MAHRE ROAD  
 ERSKINE PARK

PROPOSED BIODIVERSITY AREAS

PROJECT NUMBER: ST-01  
 SCALE: 1:7500 @ A1  
 DATE: 15/08/2011

PROJECT NAME: CSR SITE  
 LENORE LANE AND MAHRE ROAD  
 ERSKINE PARK



Corridor	Corridor Name	Area (sq m)	Total Area (sq m)
1a	CSR	2.2	2.2
1b	MACQUARIE GOODMAN	2.2	4.4
1c	MACQUARIE GOODMAN	2.2	6.6
2a	MACQUARIE GOODMAN	2.2	8.8
2b	MACQUARIE GOODMAN	2.2	11.0
2c	MACQUARIE GOODMAN	2.2	13.2
3a	MACQUARIE GOODMAN	2.2	15.4
3b	MACQUARIE GOODMAN	2.2	17.6
3c	MACQUARIE GOODMAN	2.2	19.8
4a	MACQUARIE GOODMAN	2.2	22.0
4b	MACQUARIE GOODMAN	2.2	24.2
4c	MACQUARIE GOODMAN	2.2	26.4
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5b	MACQUARIE GOODMAN	2.2	30.8
5c	MACQUARIE GOODMAN	2.2	33.0
6a	MACQUARIE GOODMAN	2.2	35.2
6b	MACQUARIE GOODMAN	2.2	37.4
6c	MACQUARIE GOODMAN	2.2	39.6
7a	MACQUARIE GOODMAN	2.2	41.8
7b	MACQUARIE GOODMAN	2.2	44.0
7c	MACQUARIE GOODMAN	2.2	46.2
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10b	MACQUARIE GOODMAN	2.2	63.8
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59c	MACQUARIE GOODMAN	2.2	389.4
60a	MACQUARIE GOODMAN	2.2	391.6
60b	MACQUARIE GOODMAN	2.2	393.8



# **APPENDIX A**

## **Biodiversity Restoration and Implementation Plan for Erskine Park Release Area (Greening Australia NSW)**

# **Biodiversity Strategy 2005: Erskine Park Employment Area**

18 March 2005

Prepared for:

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## DISTRIBUTION

Revised Biodiversity Strategy 2005: Erskine Park Employment Area

22 February 2005

Copies	Recipient	Copies	Recipient
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1	Brett Lee CGP Management		
1	HLA Sydney File S6000620		

This document was prepared for the sole use of CSR and the regulatory agencies that are directly involved in this project, the only intended beneficiaries of our work. No other party should rely on the information contained herein without the prior written consent of HLA-Envirosciences Pty Limited and CSR.

By

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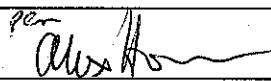
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## APPENDICES

- Appendix A: Biodiversity Links
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- Appendix C: Implementation Stages

## FOREWORD

The Erskine Park Employment Area (EPEA) landowners in consultation with other stakeholders have developed a Biodiversity Strategy for the EPEA. The Strategy is the result of an interactive journey between the landowners and other local and state government stakeholders to arrive at a conservation solution that provides a triple bottom line balance between protection of significant ecological features and development opportunities within EPEA.

To arrive at this outcome the landowners engaged a range of specialist input including HLA-Envirosciences Pty Ltd (HLA) to consolidate the results of previous ecological studies and to develop a strategic framework for the protection of significant biodiversity values while ensuring viable development opportunities.

This Strategy offers a way forward for Council in its decision making and strategic planning and will provide greater certainty and consistency for both Council and developers.

It is recommended that the Penrith Local Environment Plan, EPEA Development Control Plan and S94 Contributions Plan be reviewed and amended as necessary to align with this Strategy.

A comprehensive Implementation Plan for this Strategy is to be developed following endorsement of the Strategy and will provide detailed information on the ownership, funding, and management/maintenance arrangements for the conservation of biodiversity values at EPEA and the surrounding area as identified in the Strategy.



## EXECUTIVE SUMMARY

### Purpose

The purpose of this Biodiversity Strategy is to provide a strategic framework for the conservation of biodiversity within EPEA and the surrounding environment and to provide a basis for review and (as necessary) amendment of aspects of the DCP and other relevant planning instruments and development control documents. The Strategy and the amended Council documents will deliver a platform for decision making in relation to development and conservation within the EPEA.

### Strategy Outline

The basis of the Strategy is the allocation of land and the revegetation of areas to create a continuous east-west biodiversity corridor between South Creek and Ropes Creek through the EPEA. ... This will provide an east-west corridor biodiversity "link" between the South Creek and Ropes Creek riparian corridors (refer Appendix A) to assist in the conservation of local biodiversity values. In the order of 215 hectares of land will be provided to create this corridor, of which 113.4 hectares is currently in private ownership (refer Appendix B). This area represents approximately 25% of the EPEA. A proportion of this area has existing viable communities, whilst other areas will be revegetated.

The proposal for the implementation of the Strategy, including the ownership of the land, the management and the funding are summarised as follows:

### Ownership

Two broad ownership models for the existing privately owned land have been explored as part of this Strategy including 'public', and 'private'. Following discussions with PCC, the preferred option is to place the biodiversity lands in public ownership. The model proposed is thus as follows:

- (i) The lands are identified by survey (as part of the development application process) and either subdivided from the parcel of developable land or a Section 88B instrument is created over the lands under the provisions of the Conveyancing Act that establishes measures to protect the biodiversity elements within the defined area.
- (ii) The subdivision or section 88B instrument would be complemented through a Landowners Agreement which would require the owner of the identified land to be a party to the Biodiversity Management Plan (BMP).
- (iii) The BMP would require the owner of the land to contribute the sums of money identified in the BMP for the establishment, maintenance and management of the land for a period of six years.
- (iv) The BMP would also require the dedication of the land at no cost to Greening Australia at the expiration of the six year period or upon payment of the sum of money identified in the BMP.

### Management

The management of the biodiversity area will have two phases:

- Phase One: Establishment and Restoration; and
- Phase Two: Ongoing Maintenance.

Phase one will be for a period of up to six years which is considered sufficient time to allow the biodiversity area to become ecologically self-sustaining. This period may be less for areas

already vegetated. Phase two work is the maintenance required following the initial establishment period and would continue in perpetuity.

Irrespective of which ownership model is adopted within the EPEA the management regime would be consistent and uniform across the dedicated biodiversity area. To facilitate this it is proposed that a Biodiversity Management Plan be developed for the whole biodiversity corridor and related areas (as shown in Appendix B) detailing all proposed establishment and restoration activities, and that management of the biodiversity lands be the responsibility of Greening Australia. Details on the establishment process, estimated establishment costs and the timing of revegetation have already been provided by Greening Australia and are outlined in detail in Section 8.4.

## **Funding**

### *Phase 1: Establishment and Restoration*

Funding required to implement Phase 1 has been estimated by Greening Australia to be in the order of \$2million. A Landowners Agreement will be developed on this basis that establishes the overall funding arrangements including the contribution from the landowners, the provision of funds for areas not owned by the landowners and the method and timing of payment. One option is for the funding to be provided when the land is dedicated. Further options will be developed for more complex land, including the CSR Landfill site.

### *Phase 2: Ongoing Maintenance*

Funding required to implement Phase 2, which involves the ongoing maintenance of the biodiversity area, has been estimated by Greening Australia as costing between \$30,000 and \$50,000 per annum. There are three funding models identified for phase two, namely a biodiversity levy or a differential levy and landowner's contribution. All of these options are seen as viable funding mechanisms, however the final decision on which model is adopted is the subject of continued discussions with PCC.

## **Next Steps**

The next steps are for PCC and DEC to endorse the Biodiversity Strategy and establish the proposed areas, included in Appendix B, as the agreed biodiversity lands in the EPEA. This will also provide agreement to the development of the remaining areas for industrial purposes. PCC will then need to initiate a review and (as appropriate) amendments to the DCP, s94 Contributions Plan, and LEP, to reflect the agreed Strategy. A decision on the on going funding arrangements for the ongoing maintenance will also need to be made and the necessary documentation put in place.

An Implementation Plan for the proposed works will be developed following approval of this Strategy. This will provide details on the Landowners Agreement and associated documents and establish the Conservation Management Plan for the areas, including the maintenance program. This will be made available for review by Council, DEC and DIPNR as appropriate.

# 1 INTRODUCTION

HLA-Envirosciences Pty Ltd (HLA) was engaged by CSR on behalf of the Erskine Park Employment Area (EPEA) landowners (landowners) to develop a Biodiversity Strategy (the Strategy) for the EPEA drawing on previous specialist and management reports prepared for the EPEA.

The Strategy is to provide an overarching framework for biodiversity conservation as it relates to development within the whole of the EPEA.

# 2 BACKGROUND AND CONTEXT

The EPEA represents Penrith City Council's (Council's) principal and strategic response within its local government area to the long term demand for employment lands in Western Sydney. In progressing this initiative Council commissioned Biosis Research in 1999 to undertake an environmental study of the EPEA. The purpose of this study was to identify the biodiversity limitations that may apply to the future development of the EPEA and to recommend areas that may be developed, or that should be retained or conserved. The EPEA totals some 500 ha, however of this 500 ha the recommendations in the Biosis Research report coupled with restrictions associated with the provision of utilities resulted in only 275 ha of developable land being available. On the basis of this report Council adopted its Development Control Plan for the EPEA in 2002. The DCP adopted the recommendations in the Biosis Report regarding biodiversity conservation and presented these constraints in Map 3 of the DCP.

Since the Biosis Report and the DCP were prepared, several environmental studies and ecological surveys have been undertaken in consultation with Council, including a report by Kevin Mills and Associates in 2003. These studies have highlighted limitations with the original Biosis Report and consequently the biodiversity strategy within the DCP. These include for example:

- a) ground truthing has shown that *Hypsela* is not present on the Austral land as assumed in the Biosis Research study and the DCP;
- b) broader off site conservation opportunities were not fully considered ie a linkage between the EPEA and surrounding biodiversity values by creating an east-west corridor between South Creek and Ropes Creek;
- c) the ownership, funding and management of biodiversity conservation within the EPEA; and
- d) better integration of biodiversity conservation and development opportunities is needed in order to achieve a more balanced outcome that protects key ecological features while facilitating development of the EPEA as per the strategic objectives.

In order to address the issues highlighted in recent studies the landowners agreed to develop a Biodiversity Strategy that consolidated the previous studies and presented a balanced approach for conservation and development within the EPEA, including the mechanisms for ownership, funding and on going management of the biodiversity values within EPEA.

It was envisaged that the Biodiversity Strategy would primarily provide a strategic framework for integrating biodiversity conservation and development within the EPEA lands as well as offering a basis for reviewing (and as necessary amending) the DCP and any other relevant environmental planning instruments applicable to the EPEA.

### 3 PURPOSE OF THE BIODIVERSITY STRATEGY

The purpose of this Biodiversity Strategy is to provide a strategic framework for the conservation of biodiversity within EPEA and the surrounding environment and to provide a basis for reviewing and (as necessary) amending the biodiversity aspects of the DCP and other land use control instruments. The Strategy and the amended DCP/documents will deliver a platform for decision making in relation to development and conservation within the EPEA.

The Strategy consolidates the results and recommendations provided in the various ecological studies prepared for the EPEA and is the result of on going discussion between the landowners and Council.

The purpose of biodiversity conservation at Erskine Park is:

*To ensure the long-term sustainability of remnant natural ecological systems and native species while securing economic development opportunities for the area and advancing the strategic goals of Penrith City Council.*

## 4 STRATEGIC CONTEXT

### 4.1 Western Sydney

In May 2004, Premier Bob Carr addressed the Sydney Futures Forum on the topic of population and employment growth in Western Sydney. Mr Carr noted the success of the strategic development of employment areas in the greater west to service the increasing population growth in this area of Sydney. This strategy has been propelled by the development of transport infrastructure such as the M4, M5 and particularly Westlink M7 (formerly known as the Western Sydney Orbital). Mr Carr announced that the government intends to increase the area of land set aside for employment zones under State Environmental Planning Policy 59, including land in the Ropes Creek area facilitated by a proposed link road between Erskine Park Employment Area and Westlink M7. In supporting development of this scale, Mr Carr notes the importance of environmental management and particularly comments on the topic of global warming and the need to manage the carbon balance.

The first Western Sydney Regional State of the Environment Report 2000, was published in 2002 by the Western Sydney Regional Organisation of Councils (WSROC). This report states that there is now less than 26% of the original cover of Cumberland Plain Woodland in Western Sydney (approximately 10,000 ha of high quality vegetation remaining within the Penrith local government area), due mainly to land clearing for agricultural activities and residential developments, leading to simplification and fragmentation of habitat. To address this WSROC proposes the:

- purchase of remnant bushland by public authorities, Councils and non-government organisations;
- zoning and land use planning controls;
- development of recovery plans; and
- development of management plans.

The report discusses the need for habitat connectivity to protect the remnant pockets of biodiversity in Western Sydney. The report states that:

*“Isolated pockets of native vegetation surrounded by agricultural, residential and industrial landscapes...are often insufficient to sustain viable populations of some native flora and fauna. In such instances, ‘wildlife corridors’, which are lines of native vegetation connecting separate habitat areas, are essential for maintaining biodiversity. Wildlife corridors enable fauna to gain access to larger habitats ...and may also assist native plant species to spread and colonise new areas over time.”*

Further to this, the report provides the following sustainability goals and associated indicators:

Sustainability Goal	Sustainability Indicators
Regeneration of an ideal of at least 15% of the full pattern of original bushland in the Western Sydney Region.	Area and condition of the remaining locally native bushland as compared with an idealised goal of at least 15% of the original bushland at settlement.
Wildlife corridors and urban living are mutually compatible.	Areas of remnant vegetation and habitat corridors with habitat value and visual quality maintained and enhanced within the built urban environment (currently subject to conflicting zoning).

Sustainability Goal	Sustainability Indicators
Five and 20 year projections incorporated into Council State of the Environment Reports and Management Plans, including provision for a Green Tax.	Long term budgets for the Green Tax in relation to biodiversity management in Western Sydney.
Environmental stewardship in all education at all levels.	Planners, community consultations and industry workshops include an understanding of ecological principles.

## 4.2 The Erskine Park Employment Area

The EPEA is part of the State Government's Employment Lands Development Program referred to above. As such this Program heralds significant opportunities for the provision of employment in the area, with a report by BIS Shrapnel (August 2003) identifying the potential for over 26,600 annual full time equivalent jobs over the next 10 – 15 years and \$1.48 billion of investment in terms of gross value added for the State of NSW. The EPEA comprises a significant portion of this with some 500 hectares within the Penrith City Council (Council) local government area (LGA).

The EPEA is significant as it represents Council's principal strategic response to the long term demand for employment lands. It will provide the City of Penrith with a new supply of industrial land strategically located with access to Western Sydney's road transport system, namely the M4 motorway and the proposed Westlink M7 (formerly known as the Western Sydney Orbital) which will provide local employment opportunities for the rapidly growing local population.

## 5 CONSERVATION PRINCIPLES

The approach adopted in this Biodiversity Strategy for the EPEA is based on the conservation principles associated with sustainability and in particular ecological sustainability. These principles are outlined below followed by the conservation principles adopted for the EPEA.

### 5.1 Sustainability

The "commons" is any resource which is shared by a group of people such as the air we breath and the water we drink. In many parts of the world; new land for farming and grazing land for stock, fish from the sea, wood for fuel and housing are treated as "commons". The concept of the "commons" and its relationship between population growth and environment was noted in *The Tragedy of the Commons*, the first paper in Environmental Ethics, published by Garrett Hardin in 1968. Hardin noted that:

*"...in terms of the practical problems that we must face in the next few generations ...it is clear that we will greatly increase human misery if we do not, during the immediate future, assume that the world available to the terrestrial human population is finite."*

The issue of there being finite environmental resources to sustain the global population was the cornerstone of the Brundtland Report (also known as *Our Common Future*) published in 1987 by the United Nations Commission on Environment and Development. The notion of managing economic growth without depleting natural resources or harming the environment has been labelled 'sustainable development' and was defined in the Brundtland Report as:

*"development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

### 5.2 Ecological Sustainability

In ecological terms sustainability has come to be associated with the protection of biodiversity. Biodiversity can be considered at three levels:

- Genetic – that is, the differences between the genes of particular species;
- Species – where a particular variety of animal or plant may occur in many different forms; and
- Ecosystems – where a habitat contains a number of species which depend on each other for their survival.

Ecological sustainability therefore refers to the ability of an ecosystem to support life, which in turn is dependent on the level of biodiversity. A high degree of biodiversity ensures that an ecosystem is more resilient to externalities such as adjacent development activities for example.

Ecologically Sustainable Development (ESD) is defined in Australia's National Strategy for Ecologically Sustainable Development 1992 (NSED) 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'.*

The Biodiversity Strategy for the EPEA provides an opportunity to put the principles and ethic of (ESD) into practice.

### 5.3 Conservation Principles for Erskine Park

The following conservation principles underpin the Biodiversity Strategy for Erskine Park and are based on the conservation principles promoted by Greening Australia NSW<sup>1</sup>. Greening Australia will play a key role in the management of the EPEA.

- Spatial planning: the fragmentation of remnants should be avoided and conservation areas should be configured to maintain habitat connectivity.
- Ecological rehabilitation/restoration should be modelled on the pre-existing indigenous vegetation community.
- Priority should be given to the facilitation of natural regeneration.
- The order of any re-introduction should be managed taking into account potential effects of competition between species, to ensure that less competitive species are able to establish.
- No weed species should be used in ecological restoration/rehabilitation, including Australian species which are not local to the area.
- Active weed management should be undertaken to ensure the survival of remnant vegetation.
- Every opportunity should be taken to integrate the concept of restoration/rehabilitation with broader land and water conservation objectives.
- Short and long term management strategies should be adopted to ensure the survival of new and remnant communities and species.

<sup>1</sup> Greening Australia (NSW) Inc (GANSW) is one of a nationwide federation of not-for-profit organisations which formed in 1982 - International Year of the Tree - to provide a practical means to address the need for large scale revegetation and management of Australia's native vegetation. Around the country Greening Australia is united by a common vision of "a healthy, diverse and productive environment which is treasured by the whole community". Greening Australia (NSW) Inc. is a membership based organisation which is accountable to its members via a voluntary Board of Directors which is elected by the membership. Membership of the board is made up of representatives from rural and urban landcare groups, local government, business, government agencies and committed individuals. There are approximately 90 staff in NSW who work from 21 locations in the city major regional areas. Last year Greening Australia NSW staff developed, resourced and carried out up to 80 local revegetation projects which established thousands of native seedlings and provide advice, training and support to individuals and organisations who are actively looking after native vegetation.



## 6 CONSERVATION OBJECTIVES

### 6.1 The Application of a Triple Bottom Line Philosophy

The development of an integrated framework to achieve sustainable development is known as the Triple Bottom Line (TBL) approach. The TBL approach has been widely adopted by both the public and private sector and represents a paradigm shift in environmental management when compared against past practices. A TBL paradigm integrates economic, social and environmental sustainability for current communities and future generations.

Rather than being considered as mutually exclusive, synergies between development and conservation are highlighted and the environmental opportunities associated with development maximised. This means that development can provide funding and management opportunities that allow for the restoration, rehabilitation, and enhancement of valuable ecological communities and species that may not otherwise have been possible. By looking at development in terms of a broader economic, environmental and social framework, development such as that proposed at the EPEA can provide positive outcomes from a triple bottom line perspective.

The environmental outcomes in this case include the conservation of ecological values at Erskine Park and the opportunity to enhance ecological values within the broader catchment, through developer funding rather than at community expense.

### 6.2 Conservation Objectives for Erskine Park

It is recognised from the strategic directions of the NSW Government, Penrith City Council and from the global environmental agenda discussed above that the ethic of ecologically sustainable development needs to be at the heart of the approach to biodiversity conservation at EPEA.

In recognition of this broader context, and based on the recommendations of Biosis Research and Kevin Mills & Associates, the following conservation objectives have been adopted for the EPEA.

- To ensure that the ecological systems are reinforced and rehabilitated such that they are sustainable in the long term.
- To ensure that the extent and boundary configuration of the biodiversity “concentrations” are sufficient to ensure their long term viability.
- To ensure that the conservation areas represent a viable east-west link between Ropes Creek and South Creek open space corridors.
- To ensure that examples of each significant ecological conservation feature within the Erskine Park lands are represented within the conservation areas.
- Compensatory habitat is provided for any conservation features that are removed from within the development area.
- A management strategy is developed to ensure the conservation area is adequately managed in the short to medium term.

## 7 SCIENTIFIC BASIS

The following provides the scientific basis for the Biodiversity Strategy for the EPEA in particular the science behind biodiversity corridors and compensatory habitat as they are of greatest relevance to the conservation of ecological values at EPEA.

### 7.1 Ecological Values at Erskine Park

Previous ecological assessments of the EPEA have identified significant ecological values on the site, particularly:

- Remnants of the Cumberland Plain Woodland community;
- Remnants of Sydney Coastal River-Flat Forest community;
- Regenerating *Grevillea juniperina* (listed as vulnerable under the NSW *Threatened Species Conservation Act 1995*);
- Quality flora and fauna habitat, including riparian corridors; and
- Numerous native flora and fauna species endemic to the Cumberland Plain.

As reported in *Environmental Study: Erskine Park Employment Area* by Biosis Research 1999, the Erskine Park site contains:

- a total of 152 native flora species;
- predominantly 2 vegetation communities (Grey Box Woodland a sub-unit of Cumberland Plain Woodland and Sydney Coastal River-Flat Forest);
- 37 bird species (3 introduced);
- 12 mammal species (8 introduced);
- 6 reptile species;
- 4 amphibian species; and
- 6 snail species.

The report notes that the vegetation present on the site is different in structure, species composition and size to other remnants in the locality and the region. The viability of this vegetation in Western Sydney is at risk due to the small, fragmented nature of remnants and the cumulative impacts of local development. The vegetation within the EPEA also forms a major part of the corridor that links Ropes Creek and South Creek in this locality.

A more recent report prepared by Kevin Mills & Associates in 2003 for the EPEA lands noted that the most significant conservation matters to be addressed in a Biodiversity Strategy for the park are the:

- two endangered vegetation communities (Grey Box Woodland a sub-unit of Cumberland Plain Woodland and Sydney Coastal River-Flat Forest) ;
- threatened plant species *Grevillea juniperina*;
- endangered Cumberland Land Snail and its habitat; and
- riparian corridors within and around EPEA.

### 7.2 Biodiversity Corridors

Habitat loss and fragmentation are major threats to biodiversity conservation. One way of mitigating the adverse effects of fragmentation is to improve habitat connectivity. Habitat

corridors have been shown to be valuable for the conservation of various groups of wildlife. Soule and Gilpin (1991)<sup>2</sup> defined a corridor as “a two dimensional landscape element that connects two or more patches of habitat that have been connected in historical time...” The advantages of corridors have been discussed in detail in several publications and include:

- Habitat linkages;
- Assistance in movement of individuals and genetic material through disturbed environments;
- Increase in immigration to habitat isolates;
- Facilitation of continuity of natural ecological processes in disturbed/developed environments;
- Provision of habitat; and
- Provision of ecosystem services such as water quality and stability of hydrological cycles.

Due to their linear nature, corridors need to be designed so as to avoid ‘edge effects’ which could make the habitat susceptible to invasion from exotic species and altered microclimate. The provision of a transitional landscape where possible between the corridor and the adjacent development has been suggested as the most practical way to reduce edge effects.

MacDonald, M.A. (2003)<sup>3</sup> noted that the location and design of the corridor should reflect the ecology of the area, for example corridors should be located along environmental contours to ensure habitat continuity and research has emphasised the significance of corridors around riparian margins, as they are havens for species rich and structurally diverse ecological communities.

MacDonald, M.A. (2003) concluded that while there is strong evidence to suggest that corridors are an effective conservation measure the success of corridors varies depending on the vegetation type, corridor dimensions, and geographical location. It is therefore recommended that corridors should be complemented by additional conservation solutions such as management practices, ownership, and biodiversity concentrations.

The DCP currently identifies areas within the EPEA lands as “biodiversity areas’, ‘biodiversity corridor’ and ‘riparian regeneration corridors’. The biodiversity area identified in the DCP, however, does not create a continuous linkage between the conservation areas outside the EPEA (ie an east-west link between South Creek and Ropes Creek) and is therefore unable to deliver the same level of beneficial biodiversity outcomes identified in this Strategy.

### 7.3 Compensatory Habitat

The term compensatory mitigation, or off set mitigation, refers to the practice of compensating for the loss of natural resources by providing for the restoration or creation of conservation areas either on-site or off-site. The practice is becoming increasingly common internationally as development pressures increase and land availability declines.

Within NSW the practice of providing compensatory habitat is still in its infancy as a conservation measure. Whilst there is currently no State policy or guidelines concerning the practice it is common amongst agencies such as the NSW Roads and Traffic Authority (RTA).

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<sup>2</sup> Soule, M.E. and Gilpin, M.E. (1991). The theory of wildlife corridor capability. *Nature Conservation 2: The role of Corridors* (eds D.A. Saunders and R.J. Hobbs), Beatty and Sons, Chipping Norton.

<sup>3</sup> MacDonald, M.A (2003), *The Role of Corridors in Biodiversity Conservation in Production Forest landscapes: a Literature review*, in *Tasforests* Vol. 14

From a regulatory perspective the practice needs to be considered on a case by case basis and arrangements reached based on the specifics of the proposal and local ecology.

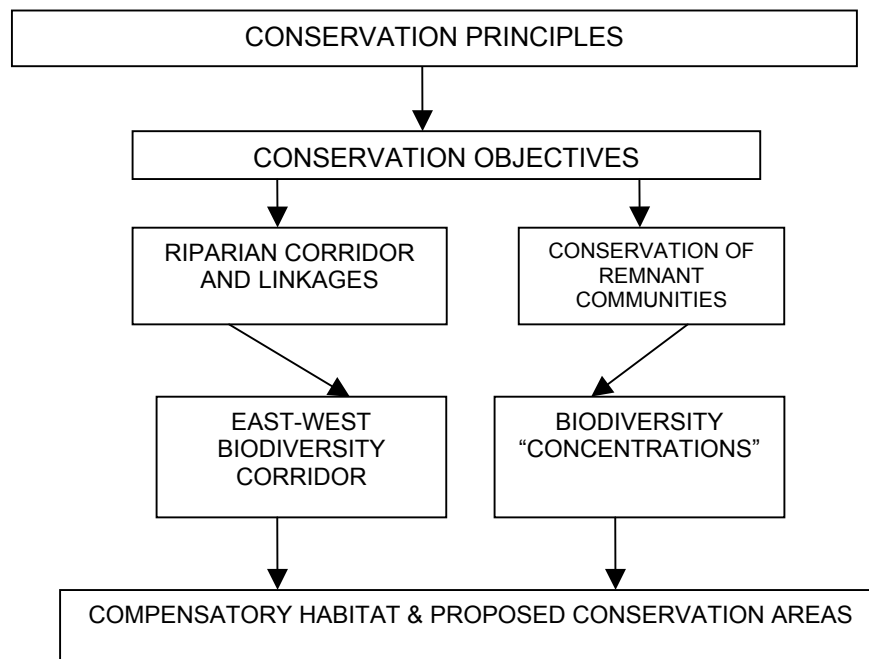
Compensatory mitigation is generally both on-site and off-site however in the latter scenario the compensatory habitat needs to be “in-kind” in other words the mitigation should be located adjacent to or contiguous with the project site and ideally should replace or create the same habitat type as the one impacted by the development.

The theory of “no net loss” is often applied to the practice of compensatory mitigation whereby habitat replacement balances habitat loss. This is often achieved by adopting a site specific ratio of habitat replaced to habitat lost.

## 8 A STRATEGIC APPROACH TO BIODIVERSITY CONSERVATION IN ERSKINE PARK

This Strategy has adopted a balanced approach consistent with the ethic of ecologically sustainable development and a triple bottom line approach that provides for economic development while protecting the known biodiversity values of the EPEA.

The concept plan below presents the structure and framework for the Erskine Park Biodiversity Strategy.



### 8.1 Erskine Park Biodiversity Corridor

As noted by Biosis Research (1999) the vegetation within the EPEA provides a number of currently discontinuous and unlinked stepping stones between Ropes Creek and South Creek in this locality. Development within the EPEA also has the potential to form a barrier limiting the movement of species between the two catchments. A continuous east-west corridor within the EPEA linking these two catchments is necessary for the conservation of local biodiversity values.

This Strategy enables the delivery of an enhanced and revegetated corridor creating a biodiversity “link” between the Defence site at Orchard Hills, the South Creek riparian corridor, the ADI site in the north, the Ropes Creek riparian corridor, and Eastern Creek riparian corridor. The corridor would then connect with an east-west corridor across the EPEA land to enable the conservation of key ecological features particularly:

- corridor around South Creek and Ropes Creek; and
- remnant ecological communities (ie Cumberland Plain Woodland and Sydney Coastal River-Flat Forest);

Refer Appendix A for a regional map highlighting the broader “biodiversity link” to the EPEA.

The concept of ecological corridors has received wide consideration in conservation planning and according to the biodiversity conservation report prepared by Kevin Mills & Associates, is

considered an appropriate approach to biodiversity conservation at Erskine Park. In addition the Biosis (1999) report and later the DCP (2002) envisaged an east-west bushland corridor through the EPEA. There is presently no continuous biodiversity corridor connecting biodiversity values on surrounding land to the east and west of the EPEA, however the existing remnants provide a series of "stepping stones", representing a highly fragmented habitat corridor. Kevin Mills & Associates has observed that the undeveloped character of the intervening land provides the potential to link these stepping stones through targeted planting programs creating an east-west corridor that links land outside the EPEA.

## 8.2 Concentrations of Biodiversity

Conservation of representative features of Cumberland Plain Woodland is a key driver for this Strategy. As noted by MacDonald, M.A. (2003) biodiversity corridors should be complemented by conservation areas. The incorporation of these areas into the strategy for the proposed biodiversity corridor would improve the opportunity to achieve the conservation objectives for the EPEA. It is therefore proposed that the dedicated conservation areas within the EPEA include "concentrations" or pockets of viable communities and where appropriate rehabilitate/restore those areas.

## 8.3 Revegetation and Compensatory Habitat

Revegetation and compensatory habitat form the linch pin of the biodiversity strategy since they move beyond the blank canvas provided by the allocation of land. They provide the opportunity to create an ecological mosaic on land which has been integrated with other land uses to afford both development and conservation opportunities.

Revegetation would provide the biological integrity of disturbed areas of the corridor lands, while compensatory habitat would enable a meaningful continuity of biodiversity values rather than simply the retention of stepping stones left over from historical land use practices.

It is anticipated that the land proposed as biodiversity corridors shown in Appendix B would be revegetated over the next 6 years. It is intended that the minimum width of the corridor would be 100 m wide but could vary in width up to 400m wide in places. Where site landscaping is proposed within the development lots abutting the biodiversity corridor this should be planted with a range of suitable native plant species creating a soft edge, or transitional landscape. The biodiversity areas proposed in Appendix B represent approximately 25% of the EPEA. The total area of woodland to be managed under this proposal on site and off site is in the order of 215 ha with the number of new plantings currently nominated at almost 170, 000. Approximate areas are provided below:

Land Owner/Agency	Approximate Dedicated Biodiversity Area (ha)
CSR	37
Enviroguard	17.0
Cottle Family	17.2
Austral	24.2
MGI	10.2
BGV Pty Ltd	6.0
Jacfin	1.8
Sydney Catchment Authority	5.7
Crown Land	7.6
Department of Infrastructure Planning and Natural Resources (DIPNR)	84.1
Penrith City Council	5.1
<b>TOTAL BIODIVERSITY AREA</b>	<b>215.9</b>



Within the above biodiversity area opportunities would be sought to develop 'concentrations' of biodiversity to complement the corridor approach to the strategy.

## 9 IMPLEMENTATION

### 9.1 Ownership of Biodiversity Area

There are several landowners within the EPEA comprising private landowners, State government agencies and Penrith City Council. The particular ownership scenario of each landowner group is discussed below.

#### 9.1.1 Government Land

Several State government agencies have landholdings within the EPEA as well as the Penrith City Council. The government (State and local) landowners are:

- Department of Infrastructure Planning and Natural Resources (DIPNR);
- Sydney Catchment Authority (SCA);
- Department of Lands; and
- Penrith City Council (PCC).

The DIPNR owned land beyond the boundary and to the west of the EPEA forms a crucial part of the east-west corridor proposed in this strategy and is currently managed by PCC on behalf of DIPNR. The land forms part of the Greening Western Sydney Program however minimal restoration work has occurred on this land to date. Council has engaged Greening Australia to maintain sections of this land.

SCA owns land at the south and south western boundary of the EPEA. A 5.7 ha strip of SCA land is to form part of the biodiversity area.

The strip of Crown land transecting the southern half of the EPEA comprises 7.6 ha of the biodiversity area within the EPEA. This is currently a non-public road reserve administered by the Department of Lands.

PCC owns a small parcel of land outside the EPEA and linked to the western boundary of the EPEA. This land comprises 5.1 ha and connects to the western section of the biodiversity corridor. Council has agreed to dedicate this land for biodiversity conservation.

#### 9.1.2 Landfill Site

The landfill is operated by Enviroguard and jointly owned by Brambles and CSR. It is expected that the landfill will operate for a further 6 years before decommissioning. Upon decommissioning CSR will fully own the landfill site, and will place a Restriction as to User over the landfill utilising the provisions of s88B of the Conveyancing Act 1919. Under the conditions of the Restriction as to User certain rights and obligations will be ascribed to CSR as the landowner. It is intended that CSR, under the terms of the Restriction as to User, would be required to manage legacy issues associated with the landfill, as well as restore the site in a manner consistent with the surrounding biodiversity area until the vegetation had regenerated sufficiently following decommissioning. Given the manner in which the Landfill will be capped, the Biodiversity composition on this lot will be different to the overall corridor.

#### 9.1.3 Other Landowners

Ownership of the balance of the EPEA biodiversity area is divided amongst the following landowners:



- CSR
- Austral
- Macquarie Goodman
- Jacfin
- BGV Pty Ltd
- Cottle Family
- Enviroguard

## 9.2 Ownership Models

There are two broad ownership models that could be adopted individually or in combination for the EPEA biodiversity area. Each model will result in the protection of the biodiversity land. The models are described as 'public', and 'private' and each model is discussed below.

### 9.2.1 Public Model

In the 'public' ownership model the biodiversity area can be subdivided from the parcel of developable land to create a separate title or at the time of subdivision of the developable land a Restriction as to User would be placed over the biodiversity area within the subdivided lots using the provisions of Section 88B of the Conveyancing Act 1919. The Restriction as to User would place restrictions on the use of the land and obligations relating to the establishment, conservation and management of biodiversity on the title holder, and would be complemented through a Landowners Agreement which would require the owner of the land to be a party to the Biodiversity Management Plan (BMP). The restrictions and obligations provided by the Restriction as to User are likely to include:

- restrictions on development within the area including any set back requirements;
- obligations for revegetation works and maintenance, including weed control;
- fencing of the biodiversity area; and
- access arrangements for maintenance.

The BMP would require the owner of the land to contribute the sums of money identified in the BMP for the establishment, maintenance and management of the land for a period of six years.

The BMP would require the biodiversity area to remain in private ownership, either Greening Australia or private developer, for the first six years (or until payment of the sum of money identified in the BMP as the establishment cost) to enable establishment of the biodiversity values. The biodiversity area could then be offered to Council for ongoing care, control and management.

In the circumstance where a biodiversity lot is created it is intended that this lot would be gifted to Greening Australia. Funding would need to be provided for the first six years through a Landowners Agreement irrespective of whether Greening Australia has ownership of a biodiversity lot or a Section 88B Restriction as to User is registered on the title of a developable lot. An alternative funding mechanism would need to be established for the on going maintenance works in perpetuity. This is further discussed in section 8.4 below.

### 9.2.2 Private Model

At the time of subdivision of the developable land either a separate biodiversity lot is created or a Restriction as to User is placed over the biodiversity area within the subdivided lots using the

provisions of Section 88B of the Conveyancing Act 1919. Unlike the public model the biodiversity area would remain in private ownership after the six year establishment period. As with the public model, funding would need to be provided for the establishment period and an alternative funding arrangement established for the on going maintenance in perpetuity.

### 9.2.3 Preferred Model

Of the models discussed above the public ownership model is the preferred model and from preliminary discussions with Greening Australia they are willing to discuss the future long term ownership of the biodiversity area within the EPEA. The option of transferring to Council could be considered at a future date if Council believe care, control and management of the biodiversity area is in its interest.

## 9.3 Management of Biodiversity Area

### 9.3.1 Phases of Management

The management of the biodiversity area will have two phases:

- Phase One: Establishment and Restoration; and
- Phase Two: Ongoing Maintenance.

Phase one will be for a period of six years either from subdivision of the biodiversity area (within the public model) or when a Restriction as to User is placed on the title of the lots containing dedicated biodiversity areas (within the private and hybrid model). Six years has been identified as a sufficient period of time to allow the biodiversity area to become ecologically self-sustaining. Phase two work is the maintenance required following the initial establishment period and would continue in perpetuity. It is considered that this work and its cost would be minimal and would include work such as weed management and pest control.

### 9.3.2 Management Approach

To ensure consistency and continuity of management it is proposed that a single entity, such as Greening Australia, be engaged to undertake the phase one and two work. Furthermore it is proposed that one entity (Greening Australia), rather than several individual landowners, adopt the management role to oversee the phase one and two work.

An access agreement would need to be established between each landowner and the entity undertaking the phase one and two work.

### 9.3.3 Management Plan

Irrespective of which ownership model is adopted within the EPEA, the management regime would need to be consistent and uniform across the dedicated biodiversity area. To facilitate this it is proposed that a Biodiversity Management Plan be developed for the whole biodiversity corridor and related areas (as shown in Appendix B) detailing all proposed establishment and restoration activities and that management of the biodiversity lands be the responsibility of Greening Australia. Key matters to be addressed in the BMP include:

- Seed collection. All vegetation to be restored on site will be sourced from local provenance seed. All collection, cleaning, storage and management activities will be in accordance with Florabank Guidelines<sup>4</sup>.

<sup>4</sup> These Guidelines have been produced by Greening Australia and have been accepted by industry as 'best practice'.

- Plant propagation. All plants will be propagated at Greening Australia Wholesale Production Nursery at Richmond.
- Bush regeneration. A complete bush regeneration program will be applied to all areas of existing vegetation for an initial 6 year period in accordance with *Best Practice Guidelines for Bush Regeneration on the Cumberland Plain, DIPNR 2004*.
- Revegetation. Revegetation activities will include both mechanical and hand installation. All revegetation will be performed in accordance with Greening Australia's *Best Practice Guidelines, Revegetation*.
- Weed Control. All areas will have a targeted weed control program dealing with noxious and highly invasive weeds.
- Community engagement. A community education and engagement strategy will run in parallel with the restoration program.

## 9.4 Funding

The funding options are presented below as they apply to phase one and two work.

### 9.4.1 Phase One

Funding for phase one ie establishment and restoration would occur through a Landowner Agreement that requires the payment of monies identified in the BMP by the landowners, based on a proportionate contribution. There are two funding models identified for phase two, namely a biodiversity levy and a differential levy.

#### **Landowners Agreement**

The relevant landowners agree to fund the phase one work for the whole of the biodiversity area. A Landowners Agreement would be developed that establishes the overall funding arrangement for phase one including the proportionate contribution from the landowners, the method of payment and who would receive the payment. As discussed previously it is advisable that one management entity be established (such as a Trust) to receive the funds and provide appropriate payment to the entity engaged to undertake the phase one work (such as Greening Australia).

With respect to the landfill, CSR would retain responsibility for the landfill until it was rehabilitated.

### 9.4.2 Phase Two

There are three funding models available for phase two ie on-going maintenance. These models are discussed below.

#### **Biodiversity Levy**

Pursuant to section 495 of the *Local Government Act 1993* Council can levy a special rate "for or towards meeting the cost of any works, services facilities or activities provided or undertaken, or proposed to be undertaken, by the council within the whole of any part of the council's area, other than domestic waste management services". Before Council can levy a special rate they require Minister approval. It is understood that the Minister is reluctant to approve a special rate for works with a value of less than \$50,000 per annum.

There is precedent within local government for special rates to be levied for environmental and conservation purposes. Examples include:

- Coffs Harbour City Council (CHCC). CHCC levies a special rate for environmental works including vegetation management and koala habitat controls;
- Eurobodalla Shire Council (ESC). ESC levies a special rate to fund environment and Landcare groups;
- Tweed Shire Council (TSC). TSC levies a special rate to fund the management of a Koala Sanctuary; and
- Warringah Council (WC). WC levies a special rate for natural resource and environmental management.

The special rate could be levied across the Penrith City local government area given that the biodiversity corridor is of regional and local significance. Phase two works are estimated to be in the range of \$30,000 to \$50,000 per annum once the biodiversity areas are established and therefore the cost of the phase two work is estimated to be relatively minor. When divided amongst the rateable land within the local government area the levy for each rate payer is estimated to be negligible. .

### ***Differential Levy***

A differential levy is a term used in this Strategy to describe a special rate for biodiversity conservation that is only levied within the EPEA. Pursuant to section 495 of the Local Government Act 1993 Council can levy a special rate “within the whole or any part of the council’s area...” While the cost per rateable hectare may be more under this scenario, the connection between the biodiversity conservation work and the land upon which the special rate is levied would be easier to establish, but it may also be argued that the maintenance of an established biodiversity corridor provides broader benefits to the public and all ratepayers in the Penrith local government area. A special rate generally requires the approval of the Minister.

### ***Landowner Contribution***

The landowners will fund the perpetual management of the corridor

### ***Concluding Remarks***

The mechanisms outlined above will provide for the required funding of the biodiversity area in perpetuity.

The preferred approach is for Council to levy a Special Rate to fund the on going maintenance of the biodiversity land. If Council accept this approach it then needs to consider whether to levy the special rate over the entire local government area or differentially apply the special rate to the EPEA alone.

Notwithstanding this it is understood that Council are still considering the merits levying a special rate as described above. Therefore the eventual model to be adopted is yet to be resolved and is dependent on the outcomes of discussions between Council and the Landowners.

## **9.5 Revegetation of Biodiversity Area**

Discussions have been held with Greening Australia about the revegetation program for the biodiversity area. Greening Australia have provided details on the establishment process, estimated establishment costs and the timing of revegetation. These details are provided below.

## 9.5.1 Establishment Process

Before planting can commence there are various site preparation works that need to be undertaken. Note there are optimal seasons for undertaking some of the tasks outlined below and this will impact on the staging of these tasks. The site preparation and planting process is outlined in broad terms below:

### **Preparation works**

Preparation works would commence in year one (2005) and would involve the following sequential steps:

- Site survey
- Rubbish removal;
- Soil surface preparation;
- Weed control;
- Erosion control;
- Fencing to control grazing and feral predators;
- Erect appropriate signage to prevent public access;
- Seed collection, cutting collection; and
- Tube stock propagation.

### **Planting process**

Planting is expected to be undertaken in years two and three with some follow-up planting to be undertaken in year four in areas where plants haven't established for whatever reason. The process will involve the following steps:

- Planting with high quality stock;
- Initial irrigation of planted areas;
- Follow up weeding and other maintenance as required;
- Bush regeneration ;
- General Maintenance including repairing fences and weed control as appropriate; and
- Periodic inspections to check progress of the restoration/rehabilitation.

### **Planting Density**

The proposed planting density for each parcel of the biodiversity area as referenced in **Appendix B**, is provided in the table below:

Area Reference	Total Area Ha	Estimated Area Revegetated Ha	No. Plants required
1a	5.6	3	4,800
1b	10.2	10.2	N/A
1c	3	3	5,050
2a	2.5	2.5	4,210
2b	7.6	1	1,300
2c	24.2	6	5,700
2d	10.5	2	2,600
2e	1.9	1	1,300
2f	3.7	2	2,300
2g	2.3	1	1,300

Area Reference	Total Area Ha	Estimated Area Revegetated Ha	No. Plants required
2h	1.9	1.9	2,500
3a	3.2	3.2	5,500
3b	2.1	2.1	3,500
3c	3.8	3.8	3,200
3d	5.1	2.5	2,700
	6.2	6.2	10,000
4a	8.9	8.9	15,000
5a	Not used		
6a	17	17	30,000*
6b	12.2	12.2	21,000
7a	84	37.5	48,000
<b>TOTAL</b>	<b>215.9</b>	<b>127.0</b>	<b>169,960</b>

\* dependant on Biodiversity strategy

Based on the information provided above from Greening Australia, the proposed planting density over the whole biodiversity area (as identified in Appendix B) is estimated to be in the order of 787 plants per hectare.

### 9.5.2 Establishment Costs and Timing

The landowners are committed to providing the required funding for the establishment of the biodiversity area and have sought advice from Green Australia on this matter. Greening Australia have estimated the total cost of establishment to be in the order of \$2M.

Based on the proposed program of works the estimated establishment cost can be broken down as follows:

Year	Establishment Works	Estimated percentage expenditure of total budget
Y1	<ul style="list-style-type: none"> <li>• Site survey;</li> <li>• Rubbish removal;</li> <li>• Soil preparation;</li> <li>• Weed control;</li> <li>• Erosion control;</li> <li>• Fencing; and</li> <li>• Signage.</li> </ul>	13%
Y2	<ul style="list-style-type: none"> <li>• Seed and cutting collection;</li> <li>• Tube stock propagation; and</li> <li>• Commence planting of western portion;.</li> </ul>	16%
Y3	<ul style="list-style-type: none"> <li>• Planting of southern and eastern portions;</li> <li>• Irrigation;</li> <li>• Weed control; and</li> <li>• General maintenance &amp; repairs.</li> </ul>	23%
Y4	<ul style="list-style-type: none"> <li>• Follow up planting;</li> <li>• Planting of DIPNR land;</li> <li>• Irrigation;</li> </ul>	24%

Year	Establishment Works	Estimated percentage expenditure of total budget
	<ul style="list-style-type: none"> <li>Weed control; and</li> <li>General maintenance.</li> </ul>	
Y5	<ul style="list-style-type: none"> <li>Site inspections;</li> <li>Bush regeneration;</li> <li>Weed control; and</li> <li>General maintenance.</li> </ul>	24%
Y6	<ul style="list-style-type: none"> <li>On going maintenance</li> </ul>	N/A

It is expected from year six (Y6) onwards the biodiversity area would be largely self sustaining and would require minimal maintenance such as weed control, rubbish collection and general repairs. Greening Australia has estimated the annual maintenance cost for the biodiversity area to be in the range of \$30,000 to \$50,000 per annum.

## 9.6 Planning Framework

The planning framework for the development of the EPEA is mostly contained within the Penrith LEP, the EPEA Development Control Plan (DCP), and the S94 Contributions Plan for the EPEA. The LEP and DCP are briefly discussed below. However, following adoption of this Strategy a comprehensive review of these instruments would be undertaken to identify any necessary amendments required to align the instruments with this Strategy. An amendment to the EPEA LEP and DCP would also provide Council with an opportunity to update other provisions of these instruments and to consider of recent initiatives highlighted through the NSW Planning Reform, such as the option of biodiversity accreditation.

### 9.6.1 Penrith LEP

The Penrith LEP 1994 (Erskine Park Employment Area) (LEP) provides the broad planning framework for the development of the EPEA.

The following objectives from the LEP are relevant and have been taken into account in developing this Strategy:

- To require development to be assessed in accordance with, and to observe, sound environmental planning principles.
- To maximise the conservation of urban bushland.
- To ensure that development takes account of the physical nature of the local environment, particularly Ropes Creek, ridgelines and the natural landscape.
- To establish environmental criteria and controls for development within the area to ensure that the environmental quality of adjoining areas is not compromised.

Amendments will be required to the LEP to ensure the provisions are fully aligned with this Strategy, including modifications to the zoning of land identified as flood prone along the eastern boundary based on recent ground truthing..

### 9.6.2 Erskine Park Employment Area Development Control Plan

In December 2002 Council adopted the *Erskine Park Employment Area Development Control Plan* (DCP). The DCP provides specific controls for the development of the EPEA in order to:

- enable a diversity of employment generating development to locate within the Erskine Park Employment Area;

- ensure that the standard of development does not detract from or unduly impact upon the existing built environment in adjoining rural and residential areas; and
- ensure that development occurs in an environmentally responsible manner and future development limits adverse impacts upon significant biodiversity.

While the DCP promotes a broad management strategy for the EPEA to facilitate a balanced approach to biodiversity conservation and development for employment purposes the environmental constraints in the DCP significantly limit development opportunities within the EPEA.

Since planning began for the EPEA several specialist reports have been prepared on the biodiversity values within the EPEA and various strategies have been recommended for the conservation of biodiversity values. This Strategy is developed drawing on the findings and recommendations provided in these studies and balancing the conservation of biodiversity values within the EPEA with the development opportunities available for the EPEA.

The DCP will be comprehensively reviewed following adoption of this strategy to ensure consistency. Based on a preliminary review of the DCP and discussions with Council, it is considered that various provisions could be amended to more accurately reflect recent ground-truthing of the EPEA, for example Hysela is not present on the EPEA and the areas of land identified as flood prone in the DCP do not fully align with ground conditions. In addition a review of the DCP provides an opportunity to better accord with the initiatives emerging through the NSW Planning Reform.

### 9.6.3 Draft Penrith Biodiversity Strategy

The *Draft Penrith Biodiversity Strategy 2003* (the Penrith Strategy) provides a valuable context for the Erskine Park Biodiversity Strategy. The following broad principles underpin the Penrith Strategy:

- Biodiversity is best conserved in situ (ie in its natural environment);
- Collective responsibility and co-operation of all governments, business and the community is essential to conserve biodiversity;
- Protecting biodiversity requires management of threatening processes by identifying, preventing and mitigating the causes of biodiversity loss;
- Allocation and use of resources should be efficient, equitable and transparent;
- Lack of full knowledge should not be an excuse for postponing action to conserve biodiversity;
- Central to biodiversity conservation is the establishment of a comprehensive, representative and adequate system of ecologically viable reserves integrated with agricultural and other resource production systems;
- The traditional association of Aboriginal people with components of biodiversity should be recognised, as well as the desirability of sharing equitable benefits arising from the innovative use of traditional knowledge of biodiversity.

The DCP will also be reviewed in light of the provisions of the Draft Penrith Strategy and any amendments required to align the DCP to the Penrith Strategy identified.



## 9.6.4 Development Approvals

Within the Penrith LGA there are significant ecological communities, particularly remnant Cumberland Plain Woodland. Cumberland Plain Woodland is listed as an endangered ecological community under the NSW *Threatened Species Conservation Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. In addition, development within 40m of the creeks within the EPEA would require a Part 3A permit pursuant to the *Rivers and Foreshore Improvement Act 1948*. Development applications therefore will be assessed against several legislative and environmental planning instruments.

The Biodiversity Strategy, as a commonly agreed position on the conservation of biodiversity within the EPEA, offers Council and DIPNR as consent authorities a framework for assessing future development applications pursuant to their duties under s79C of the EP&A Act and in making strategic planning decisions. The Strategy provides a platform for LEP and DCP amendments that will guide decision making on individual development applications and will provide greater certainty and consistency for both decision makers and developers.

The Strategy also provides Council with a basis and justification, should they choose to impose a levy across the LGA to fund the ongoing maintenance work of the biodiversity area.

## 10 NEXT STEPS

The next step is for Council and DEC to endorse this Biodiversity Strategy. An Implementation Plan for the proposed works is currently being prepared and will be made available for review by Council, DEC and DIPNR as appropriate. The Implementation Plan will provide details on the following matters:

- Landowners Agreement including ownership, funding and access arrangements;
- Contractual arrangements with Greening Australia;
- Section 88B Instrument including an outline of likely conditions;
- Conservation Management Plan framework;
- Establishment and maintenance program, specifically:
- Site preparation: program of works including soil preparation, fencing, rubbish collection and weed control;
- Seed collection/cutting collection: Program of works, selection and techniques;
- Planting: program of works , planting design, planting techniques;
- Maintenance regime: Weed control, rubbish removal and general repairs.

Following endorsement of this Strategy Council will need to initiate appropriate reviews and (as required) amendments to the LEP , DCP and s94 Contributions Plan,.. If considered appropriate, Council would also need to prepare the necessary documentation in relation to a levy for on going biodiversity management.

It is recommended this Strategy be endorsed as soon as possible to provide an increased level of certainty and consistency for both decision makers and developers at EPEA.

The broad steps for implementing the Biodiversity Strategy are provided in Appendix C.



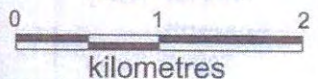
## Appendix A Biodiversity Links



ADI Site

# Erskine Park Employment Precinct - Ecological Corridors

Prepared by AAM Surveys for Mullane Planning Consultants  
September 2003



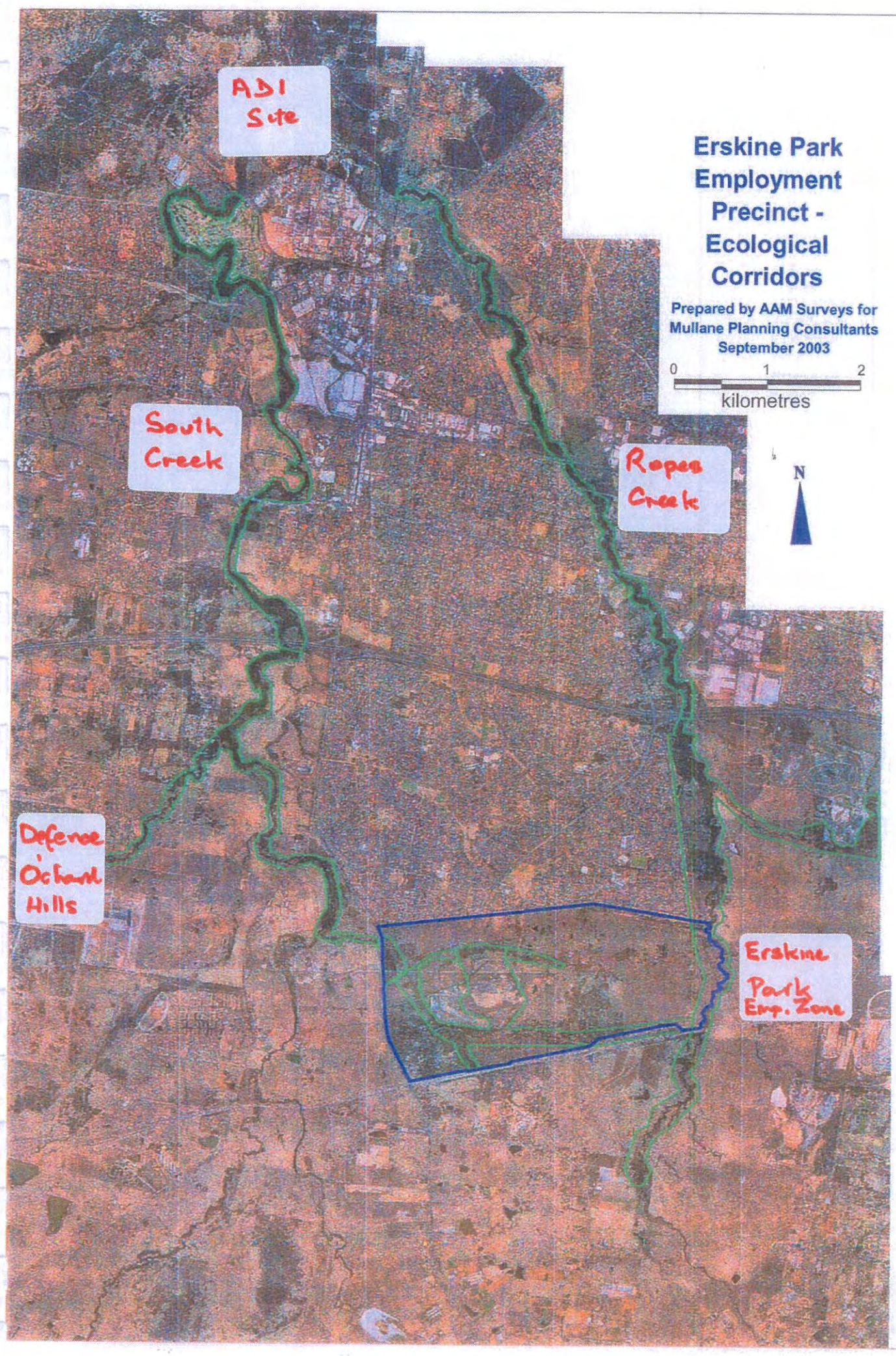
South Creek

Ropes Creek



Defence Orchard Hills

Erskine Park Emp. Zone







## **APPENDIX B**

### **Biodiversity Areas: conceptual drawing**

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ALL STRUCTURAL, DRAINAGE AND LANDSCAPING WORK TO CONSULTANTS DETAILS.

ALL WORK TO COMPLY WITH ALL CURRENT REGULATIONS AND S.A.A. STANDARDS.

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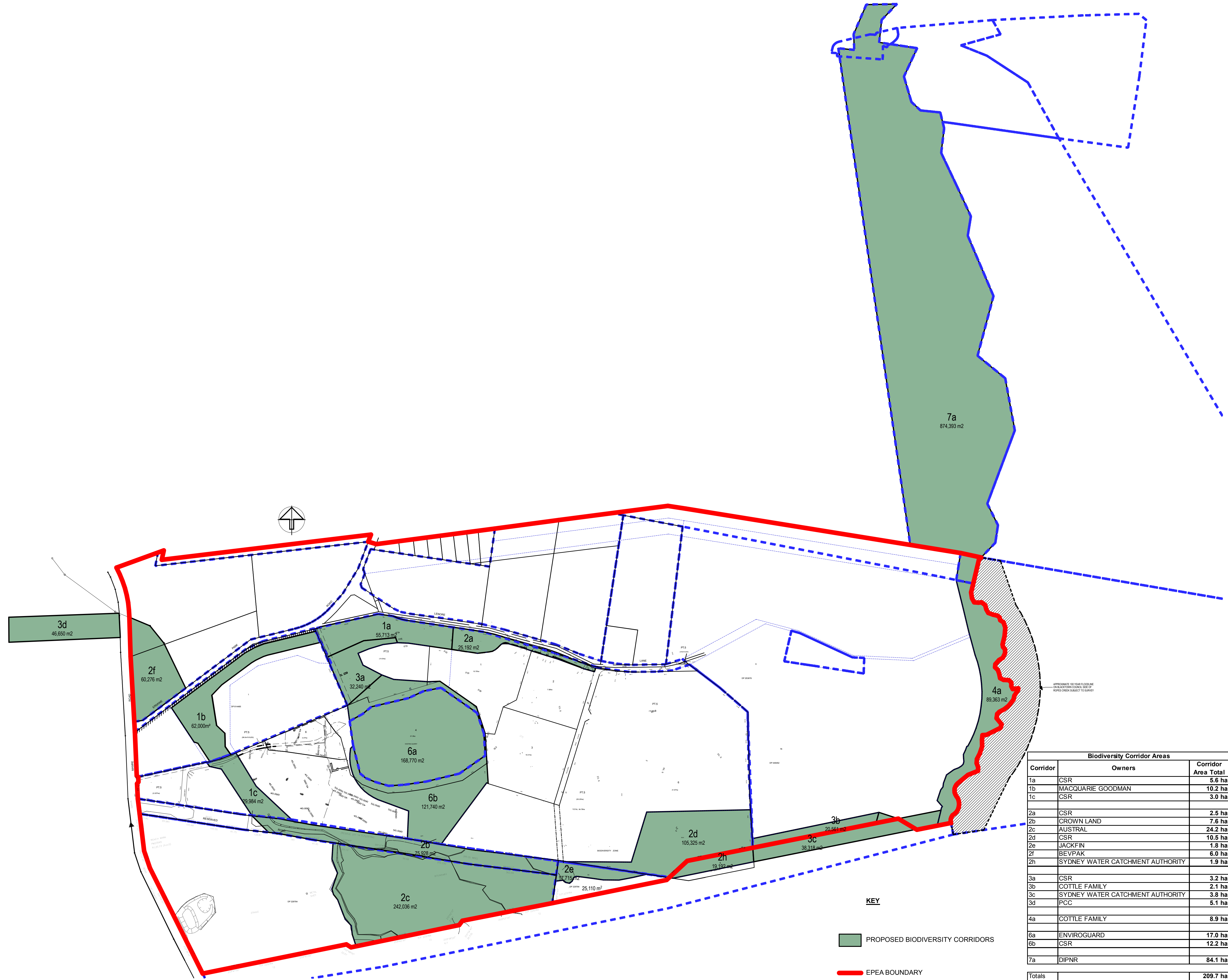
PROJECT / LOCATION  
**CSR SITE  
 LENORE LANE AND MAMRE ROAD  
 ERSKINE PARK**

DRAWING TITLE  
**Proposed Biodiversity Areas**

JOB NUMBER **03103** DRAWING NUMBER **ST-01** ISSUE **P05**

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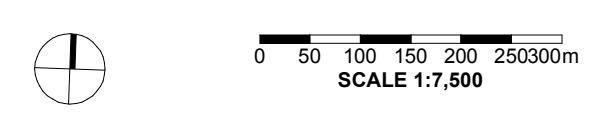
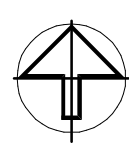


Biodiversity Corridor Areas		
Corridor	Owners	Corridor Area Total
1a	CSR	5.6 ha
1b	MACQUARIE GOODMAN	10.2 ha
1c	CSR	3.0 ha
2a	CSR	2.5 ha
2b	CROWN LAND	7.6 ha
2c	AUSTRAL	24.2 ha
2d	CSR	10.5 ha
2e	JACKFIN	1.8 ha
2f	BEVPAK	6.0 ha
2h	SYDNEY WATER CATCHMENT AUTHORITY	1.9 ha
3a	CSR	3.2 ha
3b	COTTLE FAMILY	2.1 ha
3c	SYDNEY WATER CATCHMENT AUTHORITY	3.8 ha
3d	PCC	5.1 ha
4a	COTTLE FAMILY	8.9 ha
6a	ENVIROGUARD	17.0 ha
6b	CSR	12.2 ha
7a	DIPNR	84.1 ha
<b>Totals</b>		<b>209.7 ha</b>

**KEY**

PROPOSED BIODIVERSITY CORRIDORS

EPEA BOUNDARY

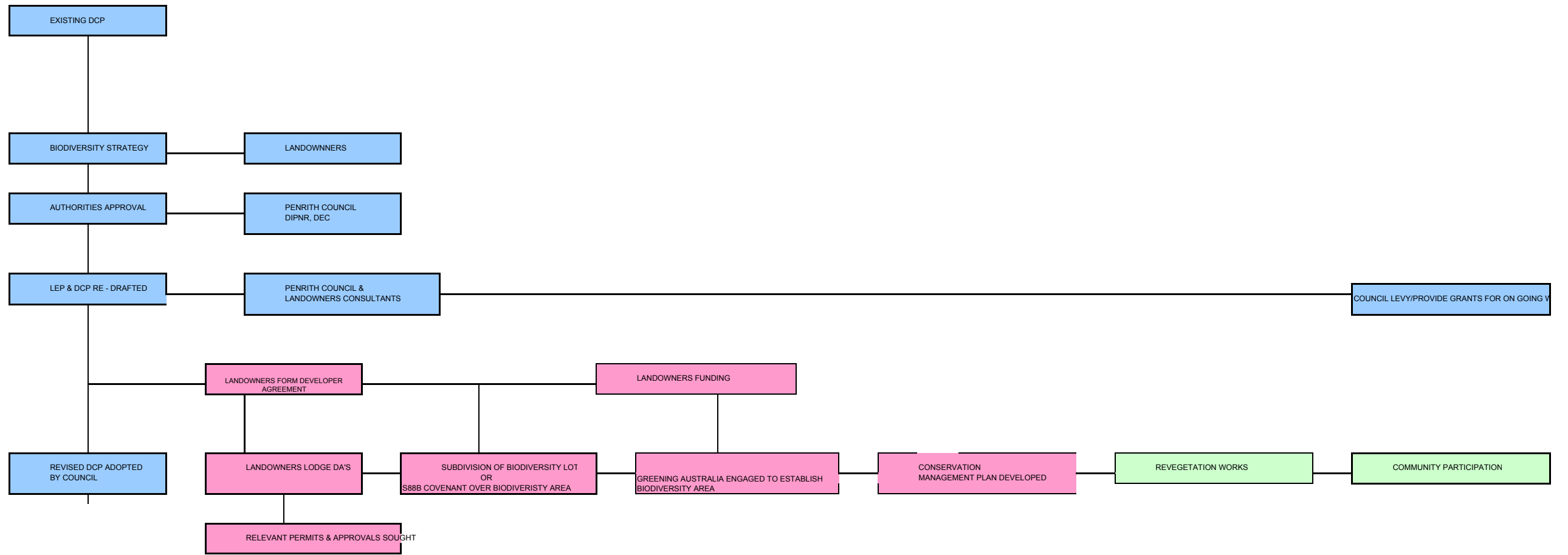




## **APPENDIX C**

### **Implementation Stages**

**ERSKINE PARK EMPLOYMENT AREA  
CONSERVATION & DEVELOPMENT PROCESS**







**APPENDIX B**  
**Biodiversity and Conservation Strategy: 2005 (HLA-  
Envirosciences Pty Ltd)**



# **Biodiversity Restoration Plan**

## **For Erskine Park Release Area**



**Prepared by Daniel Williams**  
**Programs Manager GANSW**

**June 2005**

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## **Biodiversity Restoration Plan Erskine Park Release Area**

### **1. Executive summary**

#### **1.1 Overview**

Greening Australia NSW (GANSW) has been engaged by CSR, on behalf of the “landowners” of the Erskine Park Release Area (EPRA), to prepare this Biodiversity Restoration Plan (BRP) for the proposed biodiversity corridors. HLA Envirosiences have prepared a Biodiversity Strategy for the EPRA (see section 1.3 below). The BRP describes the detail required to deliver the biodiversity strategy on site and both documents will work in tandem.

In order to achieve greater sustainability outcomes on site and to compensate for losses of vegetation during construction a 210.6 ha vegetation corridor will be restored over a 6 year period. The proposed corridor will link the existing DIPNR corridors of South and Ropes Creek and significantly increase the connectivity of local remnant vegetation. A community engagement program will run in parallel with the restoration activities described in the BRP.

#### **1.2 Aims and Objectives**

The BRP has been prepared in accordance with relevant legislation and documentation as outlined in sections 1.3 and 1.4 below. The BRP aims to provide a clear, concise and practical framework for the establishment of effective biodiversity corridors across the EPRA. The BRP also describes the restoration activities occurring in the nearby DIPNR Open Space Corridors to help “compensate” for losses of support for core vegetation during development

The aim of the BRP is to;

- Deliver the recommendations of the Biodiversity Strategy EPRA, 2005
- Define the biodiversity corridors for the EPRA
- Describe the restoration activities necessary to restore native vegetation
- Describe the maintenance program to ensure establishment
- Provide an appropriate costing for restoration work
- Establish a community engagement program
- Describe vegetation characteristics

### 1.3 Relationship with existing reports

Due to the large number of interested parties involved in the EPRA several reports and documentation already exist regarding the native vegetation occurring on site and possible restoration programs. The BRP has taken into consideration the impacts of the following documentation;

- Biodiversity Strategy: Erskine Park Release Area, 2005
- Conservation and Development Strategy Erskine Park Release Area, 2003
- Vegetation Management Plan Bluescope Steel, 2004
- Vegetation Management Plan Chep Site, 2005
- Vegetation Management Plan Walker, 2004
- Flora and Fauna Assessment Lots 3, 4, & 7, 2002
- Greening Western Sydney 2005~06 Project Proposal
- Bush Fire Risk Management Plan, 2004

All work to be performed on site will also be in accordance with the following guidelines;

- "Recovering Bushland" Best Practice Guidelines for Vegetation Restoration on the Cumberland Plain, DEC, 2005
- Florabank Seed Collection and Management Guidelines, updated 2004
- DIPNR's Best Practice Guidelines for Bush Regeneration on the Cumberland Plain, 2004
- GANSW Best Practice Revegetation Guidelines, 1999

### 1.4 Relevant Legislation

The BRP has been prepared in accordance with the provisions contained in relevant legislation and policy guidelines, including but not limited to the following;

- Environment Protection and Biodiversity Conservation Act 1999
- Threatened Species Conservation Act 1995
- Rivers and Foreshores Improvement Act 1948
- Native Vegetation Act 1997
- Environmental Planning and Assessment Act 1979
- Noxious Weeds Act 1993 (NSW)
- Hawkesbury Nepean Catchment Blue Print
- Local Government Act 1993 and Local Government Amendment (Community Land Management) Act 1998
- Relevant Penrith City Council legislation and LEP

The above listed legislation has been identified as being highly relevant to the EPRA development. This list by no means covers all relevant legislation pertaining to the site.

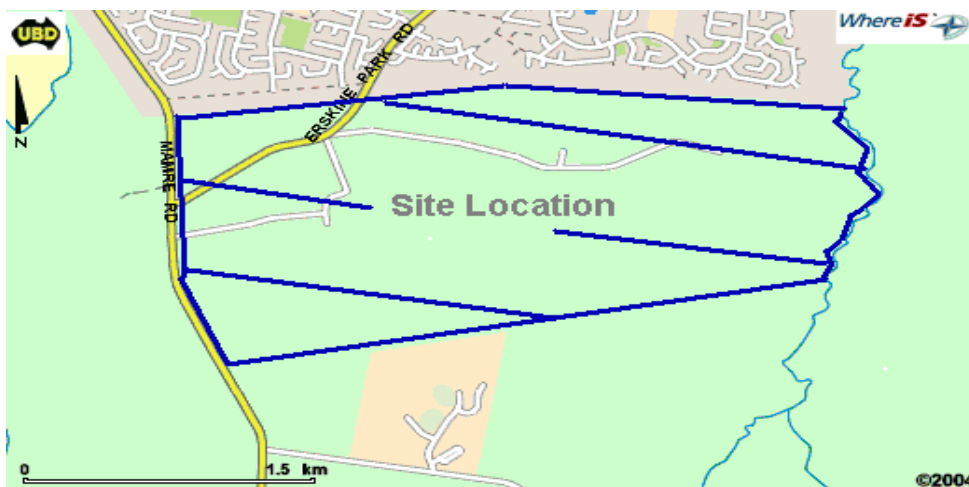
## 1.5 List of Abbreviations

The following summarises the various abbreviations used throughout the biodiversity restoration plan.

GANSW	Greening Australia NSW
DIPNR	Department of Infrastructure Planning & Natural Resources
DEC	Department of Environment & Conservation
LGA	Local Government Area (Penrith City Council)
LEP	Penrith Local Environment Plan
EPRA	Erskine Park Release Area
EECCP	Endangered Ecological Communities of the Cumberland Plain
SPW	Shale Plains Woodland
SHW	Shale Hills Woodland
SCRFF	Sydney Coastal River Flat Forest
TSC Act	Threatened Species Conservation Act
BRP	Biodiversity Restoration Plan
VMP	Vegetation Management Plan
APZ	Asset Protection Zone (firebreak)

## 2. Site Location

The site is located in Penrith LGA to the south of the residential suburb of Erskine Park. The site is bordered by Mamre Road to the west and Ropes Creek to the east with the southern boundary being the Sydney Catchment Authority pipeline easement. For location see figure 1 and for site layout see Appendix 1.



**Figure: 1** Site location (for exact site boundaries refer to Appendix 1)



### 3. Brief Description of Vegetation

The EPRA contains three vegetation communities listed as endangered under the *Threatened Species Conservation Act 1995*, these being Sydney Coastal River Flat Forest (SCRFF), Shale Plains Woodland (SPW) and Shale Hills Woodland (SHW). SCRFF communities can be found along the riparian zone of Ropes Creek and scattered across several smaller drainage lines throughout the site. The community also exists along the small creek in the DIPNR land to the west leading down to the junction with South Creek. Once out of the riparian zones and drainage lines the vegetation fades into SPW usually associated with the small ridge lines across the site. The SHW is restricted to a small patch of remnant in Zone 2d. Only species from SCRFF and SPW will be used in revegetation activities with the patch of SHW included in the bush regeneration program proposed in Zone 2d.

In general the SCRFF communities are partially infested with weeds but generally show signs of natural resilience. The riparian zones of the DIPNR South and Ropes Creek Corridors are by far the most heavily infested and will require a comprehensive bush regeneration and weed control program. Most of the SCRFF within the EPRA appears to be re-growth forest of approximately 40 years of age with the dominant canopy species being *Casuarinaglauca*. Significant remnant trees of *Angophora floribunda* still exist along the riparian zone of Ropes Creek, Zone 4a.

The condition of the SPW is generally quite high with weed infestation restricted to edges and pockets of annual and perennial weeds. Dominant canopy species are *Eucalyptus teriteicornis*, *Eucalyptus crebra* and *Eucalyptus molucana*. All SPW areas show high natural resilience and usually have a comprehensive native grass layer dominated by *Aristita roma*. Other grasses recorded included *Danthonia spp*, *Themada spp*, *Microlena spp* and *Cymbapogan spp*. The under story is in good condition with patches of *Bursaria spp*, *Dilwynia spp*, *Grevillia juniperina* and *Davesia spp* all regenerating well. The removal of stock from the site will further accelerate the processes of natural regeneration. Again most of the SPW is re-growth vegetation approximately 40 years of age with some very significant remnant trees. There are several large trees in Zone 2d.

The condition of the small patch of SHW is excellent with only minor infestation of annual and perennial weeds. The canopy is dominated by *Eucalyptus crebra* and *Eucalyptus molucana* with the feature being one of the largest *Melaleuca decora* trees on the Cumberland Plain. Again the understory is good with dense patches of *Bursaria sp* and *Dilwynia sp* occurring. The ground cover is dominated by *Aristita roma* with a mixture of *Themada sp*, *Danthonia sp* and *Cymbapogan sp*.

#### 3.1 Description Shale Plains Woodland

The canopy forms an open woodland to woodland structure (*Specht & Specht, 1999*) to a height of approximately 25m, with a canopy cover of between 10-25%. Canopy trees are generally from 10-30 years of age. The canopy is represented by a mixture of forest red gum, grey box, broad leaved ironbark, narrow leaved ironbark, thin leaved stringybark and rough-barked apple.

The mid-storey ranges to a height of approximately 15m. Again, forest red gum is the most common species in the mid-storey with white-feather honeymyrtle and occasional broad-leaved ironbark. The understorey consists of Parramatta green wattle, green wattle, blackthorn and falcate wattle.

The ground cover is dominated by native species to a height of 1m, including kangaroo grass, Wallaby Grass, Cymbopogon, Basket Grass and a variety of native herbs.

### 3.2 Description Sydney Coastal River Flat Forest

The canopy forms a woodland structure (*Specht & Specht, 1999*) to a height of approximately 30m and with a canopy cover of between 15-35%. Canopy trees are generally from 10-35 years of age. The canopy consists of broad leaved apple, cabbage gum, rough-barked apple, swamp oak, white-feather honeymyrtle and prickly-leaved paperbark.

Again there is a mid-storey comprising of swamp oak, white-feather honeymyrtle, cabbage gum and *Acacia* species. The understorey ranges from 2-4m in height and includes blackthorn and common hop bush.

The ground cover comprises mostly native species to a height of 1m and includes swamp goodenia, swamp pennywort, kidney weed and common rush.

Sedge and rush vegetation communities also occur along drainage lines throughout the biodiversity corridors and usually within the SCRFF community.

The following tables outline the species to be used in revegetation in each of the two threatened communities and the appropriate planting density. An indicative species and plant density list is also provided for the sedge and rush communities.

**Table 1: Plant Schedule for SPW**

Scientific Name	Common Name	Density
<b>Canopy</b>		
<i>Angophora floribunda</i>	rough-barked apple	1 per 5m <sup>2</sup>
<i>Eucalyptus amplifolia</i>	cabbage gum	1 per 10m <sup>2</sup>
<i>Eucalyptus crebra</i>	narrow-leaved ironbark	1 per 10m <sup>2</sup>
<i>Eucalyptus eugenioides</i>	thin-leaved stringybark	1 per 10 m <sup>2</sup>
<i>Eucalyptus moluccana</i>	grey box	1 per 10m <sup>2</sup>
<i>Eucalyptus tereticornis</i>	forest red gum	1 per 10m <sup>2</sup>
<b>Middle story</b>		
<i>Acacia decurrens</i>	Sydney green wattle	1 per 2m <sup>2</sup>

<i>Acacia falcata</i>	hickory wattle	1 per 2m2
<i>Acacia elongata</i>		1 per 2m2
<i>Acacia parramattensis</i>	Parramatta green wattle	1 per 2m2
<i>Bursaria spinosa</i>	black thorn	1 per 2m2
<i>Clematis glycinoides</i>		1 per 2m2
<i>Davesia ulicifolia</i>		1 per 2m2
<i>Davesia genistifolia</i>		1 per 2m2
<i>Dillwynia sieberi</i>		1 per 2m2
<i>Melaleuca decora</i>	white feather honey myrtle	1 per 2m2
<i>Ozothamnus diosmifolium</i>		1 per 2m2
<i>Pultenaea microphylla</i>		1 per 2m2
<b>Ground Cover</b>		
<i>Aristida ramosa</i>		4 per m2
<i>Arthropodium milleflorum</i>	pale vanilla lily	4 per m2
<i>Brunoniella australis</i>	blue trumpet	4 per m2
<i>Chloris truncata</i>		4 per m2
<i>Chloris ventricosa</i>		4 per m2
<i>Chrysocephalum semipapaosum</i>		4 per m2
<i>Commelina cyanea</i>	scurvy weed	4 per m2
<i>Cymbopogon refractus</i>	barbed-wire grass	4 per m2
<i>Danthonia tenuior</i> **	wallaby grass	4 per m2
<i>Dianella longifolia</i>	flax lily	2 per m2
<i>Dianella revoluta</i>		2 per m2
<i>Dichelachne micrantha</i>	shorthair plume grass	4 per m2
<i>Dichondra repens</i>		4 per m2
<i>Echinopogon caespitosus</i> var. <i>caespitosus</i>	tufted hedgehog grass	4 per m2
<i>Entolasia stricta</i>		4 per m2
<i>Eremophila debilis</i>		4 per m2
<i>Glycine tabacina</i>	love creeper	4 per m2
<i>Hardenbergia violacea</i>	hardenbergia	4 per m2
<i>Hibbertia diffusa</i>		4 per m2
<i>Hypericum gramineum</i>		4 per m2
<i>Imperata cylindrica</i>		4 per m2
<i>Lomandra longifolia</i>	matt rush	2 per m2
<i>Lomandra multiflora</i>		2 per m2
<i>Lomandra filiformis</i>		4 per m2
<i>Lotus australis</i>		4 per m2
<i>Microlaena stipoides</i> var. <i>stipoides</i> **	weeping meadow grass	4 per m2

<i>Oplismenus aemulus</i>		4 per m2
<i>Themeda australis</i> **	kangaroo grass	4 per m2
<i>Tricoryne elatior</i>		4 per m2
<i>Wahlenbergia gracilis</i>	native bluebell	4 per m2

\* Listed as vulnerable under the TSC Act 1995

\*\* These four grass species will be mixed together to give a total 8Kg mix and will be broad-acre seeded.

**Table: 2 Plant Schedule for SCRFF**

<b>Botanical Name</b>	<b>Common Name</b>	<b>Density</b>
<b>Canopy:</b>		
<i>Angophora floribunda</i>	rough-barked apple	1 per 5m2
<i>Angophora subvelutina</i>	broad-leaved apple	1 per 5m2
<i>Casuarina glauca</i>	she-oak	1 per 5m2
<i>Eucalyptus amplifolia</i>	cabbage gum	1 per 10m2
<i>Eucalyptus bauerana</i> *	blue box	1 per 10m2
<i>Eucalyptus tereticornis</i>	forest red gum	1 per 10m2
<b>Middle Storey:</b>		
<i>Acacia parramattensis</i>	Parramatta green wattle	1 per 2m2
<i>Bursaria spinosa</i>	black thorn	1 per 2m2
<i>Callistemon salignus</i>	willow bottlebrush	1 per 2m2
<i>Leptospermum polygalifolium</i>	lemon-scented tea-tree	1 per 2m2
<i>Melaleuca linarifolia</i>	snow-in-summer	1 per 2m2
<i>Melaleuca stypheloides</i>	prickly-leaved paperbark	1 per 2m2
<i>Ozothamnus diosmifolium</i>		1 per 2m2
<b>Groundcovers:</b>		
<i>Centella asiatica</i>		4 per m2
<i>Commelina cyanea</i>	scurvy weed	4 per m2
<i>Dichondra repens</i>		4 per m2
<i>Einadia hastata</i>		4 per m2
<i>Geranium homeanum</i>		4 per m2
<i>Lomandra longifolia</i>	mat rush	2 per m2
<i>Lomandra filiformis</i>		4 per m2
<i>Oplismenus aemulus</i>		4 per m2
<i>Pratia purperescens</i>		4 per m2
<i>Rubus parvifolius</i>		4 per m2
<i>Themeda triandra</i>	kangaroo grass	4 per m2
<i>Wahlenbergia gracilis</i>	native bluebell	4 perm2
<b>Grasses to be seeded:</b>		

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<i>Microlaena stipioides</i> **	weeping meadow grass	4 per m2
<i>Stipa verticillata</i> **	spear grass	4 per m2
<i>Danthonia tenuior</i>	wallaby grass	4 per m2
<i>Themeda triandra</i> **	kangaroo Grass	4 per m2

\* Listed as vulnerable under the TSC Act 1995

\*\* These four grass species will be mixed together to give a total 8Kg mix and will be broad-cast seeded.

**Table: 3 Wetland/Ephemeral species**

Species Name	Common Name	Density
<i>Alisma plantago-aquatica</i>	Water plantain	8 per m2
<i>Baumea articulata</i>	jointed twigrush	8 per m2
<i>Carex opressa</i>		8 per m2
<i>Cotula coronopifolia</i>		8 per m2
<i>Damasonium minus</i>	Star fruit	8 per m2
<i>Eleocharis sphacelata</i>	rush	8 per m2
<i>Juncus usitatus</i>	common rush	8 per m2
<i>Ludwigia peploides</i>		8 per m2
<i>Marsilea hirsuta</i>	nardoo	8 per m2
<i>Otelia ovalifolia</i>		8 per m2
<i>Paspalum distichum</i>	water couch	8 per m2
<i>Persicaria dicipiens</i>	slender knotweed	8 per m2
<i>Philydrum lanuginosum</i>	frogsmouth	8 per m2
<i>Phragmites australis</i>	common reed	8 per m2
<i>Protamogeton tricarinatus</i>		8 per m2
<i>Schoenoplectus mucronatus</i>	Bog Bullrush	8 per m2
<i>Schoenoplectus validus</i>	Great Bullrush	8 per m2
<i>Triglochin procera</i>		8 per m2

#### 4. Description of Work Areas

The following table provides a brief description of each of the various zones comprising the biodiversity corridors

**Table: 4 Brief Description of Restoration Zones**

Zone REF No.	Area (ha)	Area of revegetation (ha)	Approx. % native vegetation cover	3A Permit required
1a	5.6	3	50%	√
1b	4.2	4.2	0%	√
1c	2.9	2.9	5%	√
1d	2.1	2.1		√
2a	2.4	2.4	5%	
2b	7.5	2		
2c	24.2	8	70%	
2d	11.6	3	80%	
2e	1.8	1		
2f	5.7	3	50%	√
2g (not used)			80%	√
2h	1.9	1.9		
3a	2.5	2.5	0%	
3b	2.4	2.4	0%	
3c	4.6	4.6	0%	
3d	16.3	10	55%	
3e	9.9	6		
4a	15.4	14.4	5%	√
6a (not used)			0%	
6b	6.2	6.2	0%	
7a	83.4	41.4	40%	
<b>TOTALS</b>	210.6	121.1		

## 5. Description of Generic Activities

### 5.1 Application for Section 132C Licence

The restoration program is to occur in and around several vegetation communities listed as Endangered Ecological Communities under the *Threatened Species Act, 1995*. As such restoration and seed collection activities will require the issuing of a Section 132C Licence administered by the Department of Environment and Conservation (DEC).

### 5.2 Preparation of Seed Management Plan

It has been requested by DEC to attach a Seed Management Plan to the above Section 132C Licence for submission. The plan will describe;

- Description of database and recorded information
- Collection techniques to be used
- Cleaning techniques to be used
- Species lists for collection
- Storage requirements
- Appropriate reporting

### 5.3 Seed Collection Program

A carefully managed seed collection program will be an integral component of the restoration project. Seed collection is a specialized field requiring detailed knowledge of species and plant community distribution, sound knowledge of the effects of fire and excellent ecological observational skills. Good collectors require excellent plant identification skills and physical strength and endurance to work for extended periods in rough terrain and often during extreme climatic conditions.

Seed collection will be performed by experienced and qualified GANSW staff. All seed collection, management, cleaning and storage will be in accordance with *Florabank Seed Collection Guidelines* (prepared by Greening Australia and now accepted as industry best practice). (A copy can be provided if required)

The collection program will continue throughout the entire project as many native species produce seed sporadically and it can be several years between viable seed production seasons.

All plant material to be used throughout the project will need to be of local provenance. To ensure the collection process does not delay the project GANSW can draw seed from its existing seed bank for plant propagation at our wholesale nursery in Richmond.



**Figure 2** GANSW staff member collecting *Hakea spp*, South Creek.

## **5.4 Seed Cleaning**

Seed will be processed by experienced staff with a range of specialist tools and techniques to ensure efficient and effective cleaning down for storage. Care is taken to ensure that cleaning and handling techniques do not compromise seed viability.

## **5.5 Seed and Database Management**

Our experienced seed services manager will oversee and co-ordinate our teams to achieve efficient collection. He will also manage the seed database and provide project reporting as required. The reports will include work completed and a current list of the seed bank.

## **5.6 Protective Fencing and Access**

The entire biodiversity corridor will be fenced to restrict access by grazing stock and reduce anti social human behaviour. The primary objective of the corridors is to deliver biodiversity outcomes so activities such as motor bike riding and illegal rubbish dumping must be controlled.

The costings for fencing provided in this plan are based on a standard 5 strand mixed plain and barb wire stock fence. Rabbit proof fencing has been quoted for Zone 2h at the request of Penrith City Council and Zone 3C will have fencing in accordance with Sydney Catchment Authority standards. If changes to fence description are required the costing and plan will be adjusted accordingly.

GANSW has engaged the Rural Fire Service in setting the access points for the Biodiversity Corridors. These are shown in Appendix 2

### **5.6.1 Pest Animal Control**

The restoration program will include a pest animal control program targeting rabbits and foxes. GANSW will engage the Department of Lands to decide the most appropriate course of action and co-ordinate sub contractors to implement the program.

## **5.7 Senior Project Management**

Project management of the restoration program will begin on acceptance of our proposal and continue right through until the completion of the maintenance program. To ensure the success and delivery of the on-ground outcomes required in such a diverse restoration program, effective management will be essential.



Project management will occur on two separate levels. The first will involve liaison with relevant organisations and agencies, setting the strategic direction and co-ordination of the project and ensuring all organisations are working to achieve the strategy outcomes.

The next level of Project Management will be to co-ordinate GANSW staff, sub contractors and community to achieve the project targets as determined by the Biodiversity Restoration Plan.

Project management will include client liaison, necessary reporting, communication with relevant government agencies, co-ordinating community engagement program, invoicing and co-ordination within the entire delivery team.

### **5.8 Project Reporting**

Project reporting will occur on several levels. All works performed will be recorded on monthly templates and held by GANSW. These templates will form the basis of an annual reporting process to be provided to EPRA (land owner group), DEC, DIPNR and Penrith City Council. This process will continue throughout the life of the project with the review being co-ordinated by the Project Manager. The annual review will provide a complete summary of;

- Description of works completed each year
- Budget and costing review
- Progress of anticipated implementation plan
- Monitoring and evaluation of previous work
- Summary of community engagement activities
- Information relating to seed bank
- Photographic library
- Other information of interest

### **5.9 Community Engagement Strategy**

This document outlines opportunities for community engagement but a formalized program and strategy will be required. The formation of the exact program will involve negotiations with the Erskine Park Release Group, the community and other interested parties. A copy of GANSW general strategy for community engagement is attached as Appendix 3. The program will describe;

- the community engagement activities
- educational opportunities
- communication tools
- interpretive signage
- community capacity targets
- calendar of events

## 6. Restoration Program

### 6.1 Description of Key Terms

The following key terms are used throughout the description of the proposed restoration program.

<i>Regeneration-</i>	Refers to natural regeneration of the vegetation community
<i>Bush regeneration-</i>	Refers to techniques used to assist and promote natural regeneration without utilising plant material propagated in nurseries
<i>Revegetation-</i>	Refers to the planting of tube stock or similar grown from local provenance seed to re-establish vegetation
<i>Restoration-</i>	Refers to a combination of restoration activities and management techniques to restore native vegetation
<i>Practical completion-</i>	Refers to the completion of installation of revegetation activities
<i>Establishment-</i>	Refers to the completion of the minimum 24 month maintenance program applied to revegetation work to ensure plant establishment.

### 6.2 Description of the Various Restoration Techniques to be used

Following is a brief description of all the restoration techniques to be used across the site. A summary of all restoration activities occurring in each area is provided as Table 1.

#### 6.2.1 Preparation of Vegetation Management Plans (VMP)

The proposed development at Erskine Park will “trigger” the implications of the *Rivers and Foreshore Act, 1948*. This Act sets clear parameters for restoring natural drainage lines and waterways and is administered by the Department of Infrastructure Planning and Natural Resources (DIPNR). A VMP will need to be prepared to the standards and guidelines set out by DIPNR and submitted with a 3A permit application for assessment by DIPNR. We understand that various VMP’s have already been prepared for certain areas of the biodiversity corridors. GANSW has only provided fee proposal in costings for remaining VMP’s.

## 6.2.2 Plant Propagation

Plant propagation refers to the germinating of collected seed and “growing on” the plants in hiko cells or forestry tubes. This activity will be managed by the GANSW Wholesale Nursery at Richmond.

## 6.2.3 Revegetation



**Figure 3** Mechanical plantings at Hoxton Park

### 6.2.3.1 Mechanical Planting

There are certain areas on site where revegetation will occur using the “Treeliner ®” mechanical planter. All trees and shrubs will be protected with an appropriate weed mat and guarded with stakes and a plastic sleeve. The machine is owned and operated by our preferred sub contractor, Burkitt and Associates Pty Ltd. The planter is tractor mounted and can plant, bag and stake approximately 2,200 per day with a GANSW team.

The planter does not utilize deep ripping techniques and as such causes minimal soil disturbance during the planting operation. This will ensure saline soils are not disturbed during the planting operation. It simply cuts a knife line through the soil, spreads the cut wide enough to insert the plant and then utilizes press wheels to compact the soil around the plant. The operator on the planter also places the mats and bags along side each plant.

A GANSW trained team of 5 or 6 staff will then trail behind the planter. The first member will complete the “pressing in” of the plant and place stakes at the plant. The remainder of the team coordinate activities to complete the bagging and staking of the plants.

#### **6.2.3.2 Hand Installation of Native Tube Stock**

Plants are installed by hand into a planting hole excavated by hand tools or mechanical auger. The planting hole will be a minimum of 25% larger than the planting container and its edges will be suitably ‘roughed’ prior to plant installation. The plant is carefully removed from the planting container and then placed in the hole so that its soil level is level with the surrounding soil. The planting hole will then be backfilled with excavated site soil and firmly tamped down by hand and foot.

#### **6.2.3.3 Infill Planting and Replacement Planting**

This is the practice of scattering plantings throughout areas of remnant trees that have undergone bush regeneration activities or replacing plants which have died during the maintenance period. The plantings occur in the manner described in section 3 above.

#### **6.2.4 Supply and Install Mulch**

Mulch will either be delivered by truck and spread by hand or spread mechanically by our preferred contractor the “Bark Blower”. Mulch will be “euchi mulch” or similar and be free of any weeds propagules.

#### **6.2.5 Hand Broadcasting of Native Seed**

Where revegetation activities focus on the establishment of native trees, shrubs and lower story species GANSW proposes to hand broadcast native grass seed throughout the maintenance period of the restoration program. This will add further diversity to the site, particularly ground covers, and assist in achieving DIPNR targets for planting densities in 3A permit works when required.

#### **6.2.6 Direct Seeding**

Direct seeding is a very cost effective way of establishing trees and shrubs on site, especially Acacia’s. Direct seeding is simply the delivery of native seeds into the soil using a mechanical seeder known as the “Rodden” (see fact sheet attached) Acacia’s and other legumes fix nitrogen in the soil while growing and can therefore greatly improve soil condition. Many of these plants also flower heavily and are therefore very attractive to birds and insects. The addition of these pollinators into the revegetation work adds diversity and brings opportunities for natural regeneration.

The direct seeding activities will “break up” the appearance of revegetation in rows and provide a more natural landscape. Again, these activities will also help achieve DIPNR planting densities.

### **6.2.7 T-Tape Installation**

GANSW has worked with Burkitt and Associates, to design an irrigation system which is easy to install and provides maximum efficiency in delivering water to the plant. We propose to mechanically install a T-Tape irrigation system underneath the soil throughout all riparian restoration areas deemed necessary. The t-tape is installed by the “Treeliner” during the mechanical planting operation.

This system has been used in large scale revegetation projects throughout NSW with great success. Installation of this system provides an efficient irrigation system for over four years and saves large costs on watering by hand or machine after plant installation. This system also delivers maximum water to the plant with minimal evaporation losses as the water is delivered underground.

This project costing assumes that pressured water is available on site by pumps or water mains.

### **6.2.8 Watering of Revegetation**

Simply refers to the watering regime applied to the revegetation sites after installation of tube stock.

### **6.2.9 Maintenance Spraying**

To ensure the success of the revegetation activities it is essential to control weed infestation. Weeds compete with the newly installed plants for nutrients and water thereby limiting their survival rates.

Mechanically planted areas will be sprayed with a vehicle operated mechanical spray system. Areas where revegetation activities are dominated by hand planting will be sprayed with Round-up® Biactive herbicide using “back packs”.

Other maintenance to be performed to ensure plant establishment will include watering or irrigation if required, repairing damaged tree guards and plant replacement.

### **6.2.10 Hydro Mulching**

Areas of exposed or re-spread topsoil with the potential for erosion will be sprayed with an appropriate hydro mulch medium. The “mixture” will include a sterile cover crop, jute fibre and a mixture of native seed. Experience has shown that using a mixture of native peas and Acacia’s in the hydro mulch is a very inexpensive way to establish native vegetation in difficult sites.

### 6.2.11 Installation of Jute Matting

Those areas of exposed topsoil where the slope is too steep for hydro mulch to be effective will be covered with jute matting. The jute matting will be bio degradable and installed as per manufacturers specifications.

### 6.2.12 General Maintenance

GANSW will perform general maintenance activities throughout the 2 year maintenance period on each site. These activities will include repairing damaged tree guards, monitoring survival rates, installing replacement plants as required, weeding inside the tree guards and continued follow-up spot spraying.

### 6.2.13 Primary Weed Control

This component of the restoration program refers to the control of listed noxious weeds such as blackberry (*Rubus fruticosus*), St Johns wort (*Hypericum spp*), African boxthorn (*Lycium ferocissimum*) and large woody weeds such as willows and African olive. This program requires specialised equipment and chemicals and will be managed by appropriately trained GANSW staff. Control of these plants usually requires several treatments and is most effective during summer.

For a complete list of noxious weeds found throughout the Erskine Park Release Area see Table 5, below

**Table: 5 Noxious Weeds in Penrith LGA Found on Site**

<u>Botanical Name</u>	<u>Common Name</u>	<u>Category</u>
<i>Rubus fruticosus</i>	blackberry	W3
<i>Lycium ferocissimum</i>	African boxthorn	W2
<i>Cestrum parqui</i>	green cestrum	W2
<i>Hypericum perforatum</i>	St John's wort	W2
<i>Ligustrum lucidum</i>	large leafed privet	W4b
<i>Ligustrum sinense</i>	small leafed privet	W4b
<i>Ageratina adenophora</i>	croften weed	W2
<i>Opuntia spp</i>	prickly pear	W4f

Note: The category of W2, W3 and W4b is defined as follows (from *the Noxious Weeds Act 1993*):

- W2 = Must be fully and continuously suppressed and destroyed.  
W3 = Must be prevented from spreading and its numbers and distribution reduced.  
W4b= Applies to weeds that do not fit W1, W2 or W3 categories but may require control in certain areas, or situations

Suitable control of the above noxious weeds will be given priority in regard to the weed control program.

### 6.2.14 Bush regeneration and Weed Control

Table 6 describes each component of the Bush regeneration program referred to in the summary table of restoration activities (refer to Table 7).

**Table: 6 Descriptions of Bush Regeneration Activities**

Stage	Activities	Results
<p><b><u>Primary bush regeneration:</u></b> Weeding through an area for the first time only. May involve target weeding of selected species or a thorough weeding of all invasive species</p>	<ul style="list-style-type: none"> <li>• Drilling or cutting and poisoning all woody weeds,</li> <li>• poisoning and/or removing woody thickets,</li> <li>• poisoning vines and scramblers,</li> <li>• releasing struggling native plants by spot-weeding around individuals, and</li> <li>• removing smothering ground covers.</li> </ul>	<ul style="list-style-type: none"> <li>• Removes the bulk of the weed material,</li> <li>• removes the local weed seed source, and</li> <li>• creates conditions suitable for germination of natives and weeds, hence the need for intensive secondary weeding.</li> </ul>
<p><b><u>Secondary bush regeneration:</u></b> Usually carried out 3-6 months after primary weeding</p>	<p>Deals with</p> <ul style="list-style-type: none"> <li>• weed regrowth,</li> <li>• weeds missed during primary stage, and</li> <li>• weeds likely to seed within 12 months</li> </ul>	<ul style="list-style-type: none"> <li>• provides increased opportunity for natural regeneration</li> <li>• help add biodiversity</li> <li>• increased native habitat for fauna</li> </ul>
<p><b><u>Follow up bush regeneration:</u></b> Subsequent weeding sessions, determined by site conditions, e.g. the type of weeds present or the level of infestation and degradation Follow up weeding is usually carried out for several years.</p>	<p>Deals with:</p> <ul style="list-style-type: none"> <li>• weed regrowth,</li> <li>• new seedlings, and</li> <li>• monitoring and care of native seedling germination.</li> </ul>	<ul style="list-style-type: none"> <li>• ensures weeds are removed when young, cost effective</li> <li>• reduces weed management issues through time</li> <li>• continues to allow increased biodiversity</li> </ul>

For a description of weed control techniques used on specific weeds in the bush regeneration activities refer to Appendix 2.

### 6.2.15 Rubbish Removal/Minor Soil Works

There are several piles of miscellaneous rubbish scattered throughout the biodiversity corridors. GANSW proposes to remove these using a Bobcat and Tipper and our preferred contractor is Leon Parisi.

The areas disturbed during this operation will be re-graded, have native grass seed broadcast over them and then covered in brush matting. The brush matting will be supplied from the bush regeneration works during the removal of woody weeds.

### 6.2.16 DIPNR Reporting for 3A Works

DIPNR has specific reporting requirements for those areas subject to 3A Permit works. DIPNR requires a report to be submitted at Practical Completion (when all plants are installed) and then six-monthly reports throughout the 2-year maintenance period. These reports will also be available to relevant parties on request.

## 7. Activities for Each Area to Achieve Restoration Outcomes

The following table summarises the activities required in each of the 18 zones to achieve desired outcomes. All terms used are described in section 5 & 6 above.

**Table: 7 Summary of Restoration Activities**

Zone No.	Revegetation % SCRFF	Revegetation % SPW	Restoration activity
1a	80%	20%	<ul style="list-style-type: none"> <li>• Prepare VMP</li> <li>• Install protective fencing</li> <li>• Install native tube stock by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Primary weed control</li> <li>• Bush regeneration-secondary &amp; follow-up</li> <li>• DIPNR project reporting</li> </ul>
1b	70%	30%	<ul style="list-style-type: none"> <li>• Prepare VMP</li> <li>• Install protective fencing</li> <li>• Hydro mulching</li> <li>• Mechanical plantings</li> <li>• Installation of tube stock and wetland plants by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> </ul>



1c	70%	30%	<ul style="list-style-type: none"> <li>• Prepare VMP</li> <li>• Install protective fencing</li> <li>• Hydro mulching</li> <li>• Mechanical plantings</li> <li>• Installation of tube stock and wetland plants by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Direct seeding</li> <li>• Hand broadcasting of native seed</li> <li>• DIPNR project reporting</li> </ul>
2a	50%	50%	<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Hydro mulching</li> <li>• Installation of tube stock by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Direct seeding</li> <li>• Hand broadcasting of native seed</li> <li>• Bush regeneration-secondary &amp; follow-up</li> </ul>
2b	0%	100%	<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Installation of tube stock by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Primary weed control</li> <li>• Hand broadcasting of native seed</li> <li>• Bush regeneration-secondary &amp; follow-up</li> </ul>
2c	0%	100%	<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Installation of tube stock by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Primary weed control</li> <li>• Hand broadcasting of native seed</li> <li>• Bush regeneration-primary, secondary &amp; follow-up (4yrs)</li> </ul>
2d	0%	100%	<ul style="list-style-type: none"> <li>• Primary weed control</li> <li>• Hand broadcasting of native seed</li> <li>• Bush regeneration-primary, secondary &amp; follow-up (3yrs)</li> </ul>
2e	0%	100%	<ul style="list-style-type: none"> <li>• Primary weed control</li> <li>• Hand broadcasting of native seed</li> <li>• Bush regeneration-primary, secondary &amp; follow-up (3yrs)</li> </ul>
2f	50%	50%	<ul style="list-style-type: none"> <li>• Prepare VMP</li> <li>• Install protective fencing</li> <li>• Install native tube stock by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Hand broadcasting native seed</li> <li>• Primary weed control</li> <li>• Bush regeneration-primary, secondary &amp; follow-up (2.5yrs)</li> <li>• DIPNR project reporting</li> </ul>
3a			<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Installation of tube stock by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Primary weed control</li> <li>• Hand broadcasting of native seed</li> </ul>

3b	0%	100%	<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Mechanical planting</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Primary weed control</li> <li>• Hand broadcasting of native seed</li> </ul>
3c	0%	100%	<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Mechanical planting</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Primary weed control</li> <li>• Hand broadcasting of native seed</li> </ul>
3d	40%	60%	<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Mechanical planting</li> <li>• Install native tube stock by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Hand broadcasting native seed</li> <li>• Direct seeding</li> <li>• Primary weed control</li> <li>• Bush regeneration- primary, secondary &amp; follow-up (3 yrs)</li> </ul>
3e	0%	100%	<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Mechanical planting</li> <li>• Install native tube stock by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Hand broadcasting native seed</li> <li>• Direct seeding</li> <li>• Primary weed control</li> <li>• Bush regeneration- primary, secondary &amp; follow-up (3 yrs)</li> </ul>
4a	60%	40%	<ul style="list-style-type: none"> <li>• Prepare VMP</li> <li>• Install protective fencing</li> <li>• Mechanical planting</li> <li>• Install native tube stock by hand</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Hand broadcasting native seed</li> <li>• Direct seeding</li> <li>• Primary weed control</li> <li>• Bush regeneration-primary, secondary &amp; follow-up (2.5yrs)</li> <li>• DIPNR reporting</li> </ul>
6a	0%		<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Hydro mulching</li> <li>• Mechanical planting</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Direct seeding</li> <li>• Hand broadcasting native seed</li> </ul>

6b		100%	<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Hydro mulching</li> <li>• Mechanical planting</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Direct seeding</li> <li>• Hand broadcasting of native seed</li> </ul>
7a	40%	60%	<ul style="list-style-type: none"> <li>• Install protective fencing</li> <li>• Mechanical planting</li> <li>• Watering, maintenance spraying &amp; general maintenance</li> <li>• Primary weed control</li> <li>• Direct seeding</li> <li>• Hand broadcasting of native seed</li> <li>• Bush regeneration-.primary, secondary &amp; follow-up (4 yrs)</li> </ul>

All above listed restoration activities will be performed in accordance with the relevant documentation referred to in section 1.3 above

### 8. Estimate of Restoration Costs

Table 8, over the page, provides a summary of restoration costs for each zone in the biodiversity corridors. These costs have been worked out using current available information. Should site conditions or restoration works alter a revised costing will be provided accordingly.

### 9. Estimated Program of Works

Seed collection and cleaning has already begun in order to supply the revegetation and direct seeding activities with appropriate provenance seed. Revegetation will be the focus of restoration activities from mid-September 2005 through until May 2006. Revegetation will occur in Zones 1a, 1b, 1c & 2a this year and then target the DIPNR corridors next autumn. Revegetation will then continue throughout the site until completed with all revegetation areas subject to an appropriate 2-year maintenance program.

Bush Regeneration and weed control will then commence from July 2006 and continue until the program is complete in 2010.

The Enviroguard site Zone 6a and CSR land Zone 6 b will finally be rehabilitated at decommissioning of the quarry and associated activities in 2014.

For a complete breakdown of restoration program refer to Appendix 3.

### 10. Opportunities for Community Engagement and Education

The above described restoration program provides numerous opportunities for community engagement, education and feature events relating targeting vegetation restoration activities. These

June 2005

events would be staged in conjunction with significant environmental dates such as Planet Ark's "plant a tree day". GANSW provides the following suggested opportunities appropriate for the Erskine Park Release Area. Detailed discussion between GANSW and the land owner group on the exact nature of community engagement and the production of a detailed program will be necessary to finalise project costing and planning.

The ultimate aim of the program is to set up a self sustaining Bushcare/Landcare Group, working in conjunction with GANSW, taking "ownership" and setting directions for the management of their local bushland.

Recommendations include;

- Delivery of community training program to give them the skills and knowledge to help manage their local bushland in perpetuity.
- Community events targeting restoration activities
- Recreational activities allowing the community to enjoy their natural bushland
- Formation of Bushcare/Landcare Group
- Interactive community engagement program with DIPNR "open space corridors"

To deliver the above listed community activities GANSW recommends the following breakdown of proposed community activities, timing and estimate of costs.

**Table: 9 Community engagement program**

Program timing	Activity	Cost per unit	Total
Spring 2005	Seed collection and training	LS	\$8,000
Autumn 2006	Tree planting event	LS	\$12,000
Spring 2006	Guided walk and bush regeneration	LS	\$8,000
Winter 2007	A Plant a tree day	LS	\$20,000
Autumn 2007	Tree planting event	LS	\$12,000
2005-07	Community engagement material etc	LS	\$7,500
		<b>Total (ex GST)</b>	<b>\$67,500</b>

For a description of GANSW general strategy for engaging the community in new release areas see Appendix 7. This strategy also provides information regarding the actual training, restoration and recreational activities, management and benefits of a successfully delivered community engagement program.

## 11.0 References & Recommended Reading

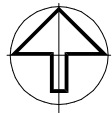
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## **Appendix 1**

### **Map of Erskine Park Release Area and Biodiversity Corridors**



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ALL WORK TO COMPLY WITH ALL CURRENT REGULATIONS AND S.A.A. STANDARDS.

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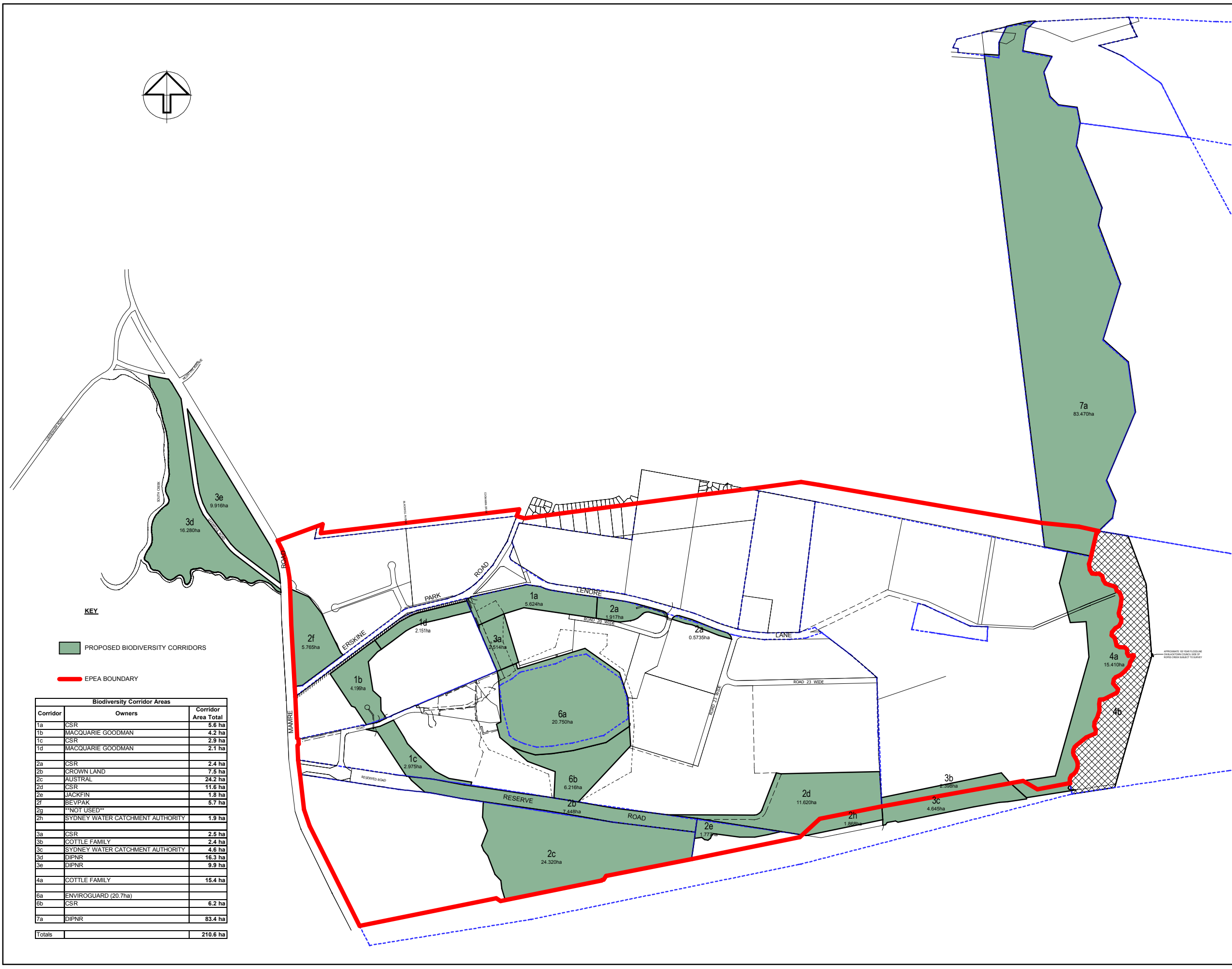
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**CSR SITE**  
**LENORE LANE AND MAMRE ROAD**  
**ERSKINE PARK**

**DRAWING TITLE**  
**Proposed Biodiversity Areas**

**JOB NUMBER** 03103 **DRAWING NUMBER** ST-01 **ISSUE** P13

**SCALE** 1:7500 @A1 **DRAWN** MB/JM **CHECKED BY**

**PROJECT PATH** Biodiversity\_011 **SHEET SIZE** A1  
**PLOT DATE** Thursday, 9 June 2005



**KEY**

- PROPOSED BIODIVERSITY CORRIDORS
- EPEA BOUNDARY

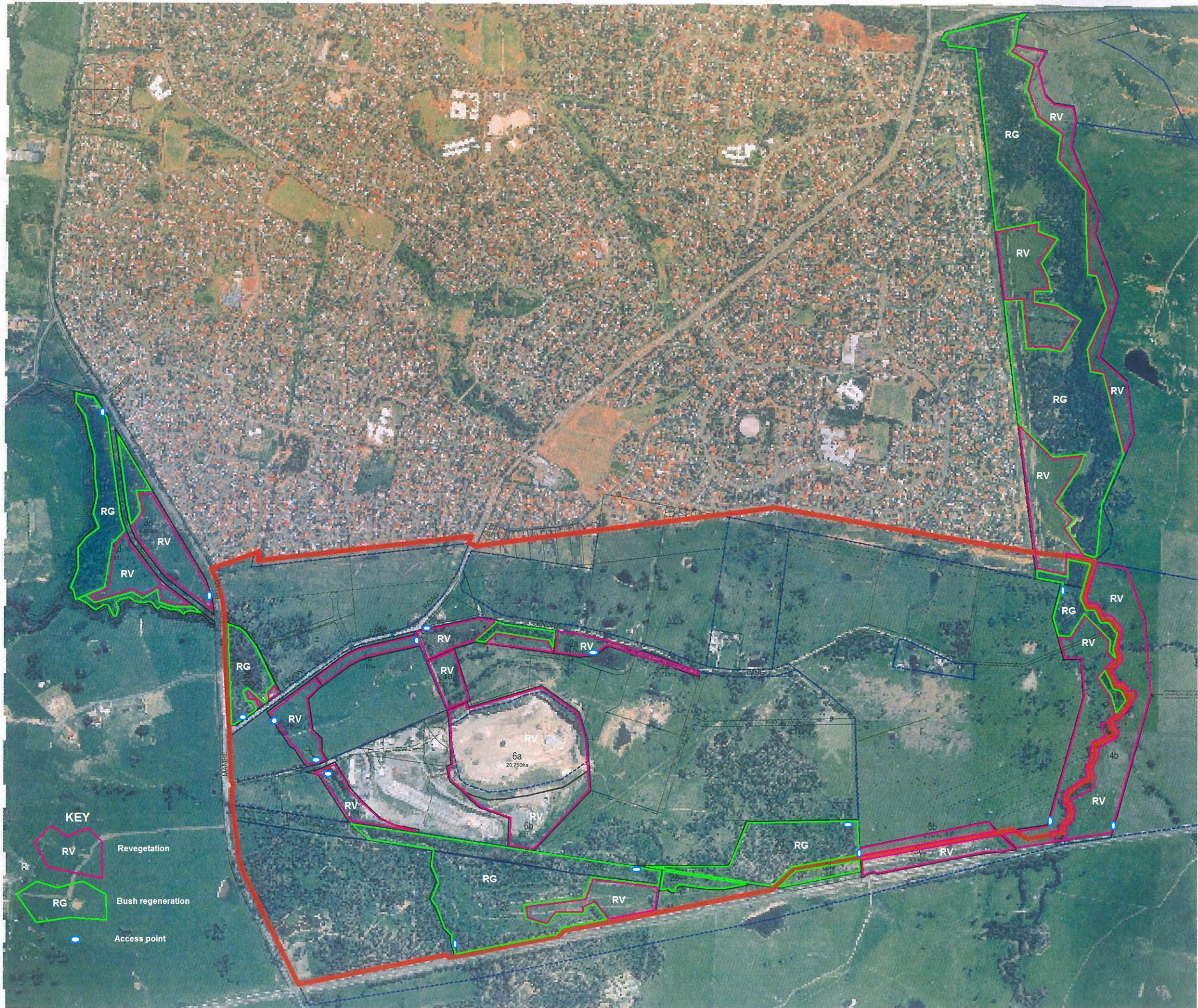
Biodiversity Corridor Areas		
Corridor	Owners	Corridor Area Total
1a	CSR	5.6 ha
1b	MACQUARIE GOODMAN	4.2 ha
1c	CSR	2.9 ha
1d	MACQUARIE GOODMAN	2.1 ha
2a	CSR	2.4 ha
2b	CROWN LAND	7.5 ha
2c	AUSTRAL	24.2 ha
2d	CSR	11.6 ha
2e	JACKFIN	1.8 ha
2f	BEVPAK	5.7 ha
2g	**NOT USED**	
2h	SYDNEY WATER CATCHMENT AUTHORITY	1.9 ha
3a	CSR	2.5 ha
3b	COTTLE FAMILY	2.4 ha
3c	SYDNEY WATER CATCHMENT AUTHORITY	4.6 ha
3d	DIPNR	16.3 ha
3e	DIPNR	9.9 ha
4a	COTTLE FAMILY	15.4 ha
6a	ENVIROGUARD (20.7ha)	
6b	CSR	6.2 ha
7a	DIPNR	83.4 ha
<b>Totals</b>		<b>210.6 ha</b>






## **Appendix 2**

### **Map Outlining Areas of Bush Regeneration/Revegetation throughout the Biodiversity Corridors and Access Points**





**KEY**

	RV	Revegetation
	RG	Bush regeneration
		Access point

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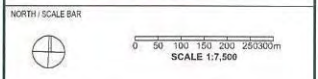
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**PROJECT LOCATION**

**CSR SITE**  
LENORE LANE AND MAMRE ROAD  
ERSKINE PARK

**DRAWING TITLE**

**Proposed Biodiversity Areas and Aerial Map**

<b>JOB NUMBER</b>	<b>DRAWING NUMBER</b>	<b>ISSUE</b>
03103	ST-14	P02
<b>SCALE</b>	<b>DRAWN</b>	<b>CHECKED BY</b>
1:7500 @A1	MB/JM	
<b>PROJECT PATH</b>	<b>SHEET SIZE</b>	
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<b>PLOT DATE</b>		
11/04/2012 10:30		



## **Appendix 3**

### **Project Implementation Gantt Chart**



PROJECT IMPLEMENTATION

Work Program EPRA Biodiversity Corridors

Estimated Program of Works

Task Name	2005			2006			2007			2008			2009			2010		
	Jul	Sept	Nov	Jan	Mar	May	Jul	Sept	Nov	Jan	Mar	May	Jul	Sept	Nov	Jan	Mar	May
<b>Generic Project Activities</b>																		
Section 132C licence	[Yellow bar]																	
Seed Collection Program	[Yellow bar]																	
Conservation Zone Protection	[Yellow bar]																	
Project Management & Reprting	[Yellow bar]																	
Community Engagement	[Yellow bar]																	
<b>Site specific Activities</b>																		
Zone 1A				[Green smiley]														
Zone 1A Maintenance																		
Zone 1B (not included in cashflow)																		
Zone 1B Maintenance																		
Zone 1C				[Green smiley]														
Zone 1C Maintenance																		
Zone 2A				[Green smiley]														
Zone 2A Maintenance																		
Zone 2B																		
Zone 2B Maintenance																		
Zone 2C																		
Zone 2C Maintenance																		
Zone 2D																		
Zone 2D Maintenance																		
Zone 2E																		
Zone 2E Maintenance																		
Zone 2F																		
Zone 2F Maintenance																		
Zone 2G	Not used																	
Zone 2G Maintenance																		
Zone 2H				[Green smiley]														
Zone 2H Maintenance																		
Zone 3A (not included in cashflow)	Commence in approx 2014																	
Zone 3A Maintenance																		
Zone 3B				[Green smiley]														
Zone 3B Maintenance																		
Zone 3C				[Green smiley]														
Zone 3C Maintenance																		
Zone 3D																		
Zone 3D Maintenance																		
Zone 3E																		
Zone 3E Maintenance																		
Zone 4A																		
Zone 4A Maintenance																		
Zone 5A	Not used																	
Zone 5A Maintenance																		
Zone 6A (not included in cashflow)	Commence in approx 2014																	
Zone 6A Maintenance																		
Zone 6B (not included in cashflow)	Commence in approx 2014																	
Zone 6B Maintenance																		
Zone 7A																		
Zone 7A Maintenance																		
Estimated Cashflow (initial works)			555K			470K			26K									
Estimated cashflow (maintenance periods)					55K	55K	55K	55K	55K	55K	55K	55K	55K	55K	55K	55K	55K	55K

Note: All works are an estimation only

KEY

- Indicates Practical Completion
- Indicates release of maintenance bond for 3A sites
- Indicates Establishment Completion
- Initial work to achieve practical completion
- Maintenance period to achieve establishment
- Additional maintenance post bond release
- Generic project activities

## Appendix 4

### Vegetation Description DEC Mapping 2002

#### 10. Shale Plains Woodland

Shale Plains Woodland is dominated by *Eucalyptus moluccana* and *E. tereticornis* with *E. crebra*, *E. eugenioides* and *Corymbia maculata* occurring less frequently. These species often form a separate small tree stratum, occasionally including other species such as *Exocarpus cupressiformis*, *Acacia parramattensis* subsp. *parramattensis* and *Acacia decurrens*. A shrub stratum is usually present and dominated by *Bursaria spinosa*. Common ground stratum species include *Dichondra repens*, *Aristida vagans*, *Microlaena stipoides* var *stipoides*, *Themeda australis*, *Brunoniella australis*, *Desmodium varians*, *Opercularia diphylla*, *Wahlenbergia gracilis* and *Dichelachne micrantha*. Shale Plains Woodland is the most widely distributed community on the Cumberland Plain. It predominantly occurs on soils derived from Wianamatta Shale, but also occurs on Holocene alluvium in well-drained areas that are infrequently inundated. Isolated patches of Map Unit 10 may be found on soils derived from the Mittagong Formation, but only in the vicinity of outcrops of almost pure shale. Very rarely, it may occur on soils derived from Tertiary Alluvium, but it is more usual for Map Unit 10 to grade into Map Unit 103 (Shale Gravel Transition Forest) near the boundary of Shale and Tertiary Alluvium. Towards the edge of the Cumberland Plain, Map Unit 10 grades into Map Unit 1 (Shale Sandstone Transition Forest, Low Sandstone Influence) as the depth of the shale soils decreases and the influence of the underlying sandstone increases. In the southern half of the study area Map Unit 10 grades into Map Unit 9 (Shale Hills Woodland) with increasing elevation and ruggedness. This gradation commences on the gentle rises running south from Prospect Reservoir in the centre of the plain, and south of Mulgoa Nature Reserve on the western boundary of the plain.

#### Previous Floristic Classifications:

Cumberland Plain Woodland as described by Benson (1992) (Map Units 9b, 10c and 10d) and as listed under the NSW Threatened Species Act (1995), is herein divided into two separate communities: Map Unit 9 (Shale Hills Woodland) and Map Unit 10 (Shale Plains Woodland). Map Unit 10 includes areas previously recognised as Map Units 9b, 10c and 10d (Benson 1992), but most often corresponds with Map Unit 10c. Although Benson (1992) ascribed vegetation in the north of the study area to Map Unit 10d these areas are included in Map Unit 10 in the present survey.

**Diagnostic Species**

<b>Trees</b>	<b>Ground Covers</b>	<b>Ground Covers</b>
<i>Angophora floribunda</i>	<i>Dichondra repens</i>	<i>Entolasia stricta</i>
<i>Angophora subvelutina</i>	<i>Brunoniella australis</i>	<i>Microlaena stipoides</i>
<i>Eucalyptus amplifolia</i>	<i>Aristida ramosa</i>	<i>Themeda australis</i>
<i>Eucalyptus baueriana</i>	<i>Desmodium varians</i>	<i>Cheilanthes sieberi</i>
<i>Eucalyptus crebra</i>	<i>Asperula conferta</i>	<i>Glycine tabacina</i>
<i>Eucalyptus eugenioides</i>	<i>Dichelachne micranthra</i>	<i>Opercularia diphylla</i>
<i>Eucalyptus fibrosa</i>	<i>Oxalis perennans</i>	<i>Whalenbergia gracilis</i>
<i>Eucalyptus globoidea</i>	<i>Danthonia tenuior</i>	<i>Paspalidium distans</i>
<i>Eucalyptus longifolia</i>	<i>Lomandra filiformis</i> var. <i>Filiformis</i>	<i>Eragostis leptostachya</i>
<i>Eucalyptus moluccana</i>	<i>Aristida vagans</i>	<i>Dialnella longifolia</i>
<b>Trees</b>	<b>Ground Covers</b>	<b>Ground Covers</b>
<i>Eucalyptus paniculata</i>	<i>Gnaphalium sphaericum</i>	<i>Calandrinia pickeringii</i>
<i>Eucalyptus punctata</i>	<i>Goodenia hederacea</i>	<i>Danthonia setacea</i> <i>Pimelia curviflora</i> . Var. <i>subglabrata</i>
<i>Eucalyptus tereticornis</i>	<i>Arthropodium milleflorum</i>	<i>Rorippa laciniata</i>
<i>Corymbia maculate</i>	<i>Danthonia tenuior</i>	<i>Wurmbea biglandulosa</i>
	<i>Cymbopogon refractus</i>	<i>Dipodium punctatum</i>
<b>Shrubs</b>	<i>Echinopogon caespitosus</i> var. <i>caespitosus</i>	<i>Glycine clandestina</i>
<i>Bursaria spinosa</i>	<i>Dichopogon strictus</i>	
	<i>Ranunculus lappaceus</i>	
	<i>Brachycome multifida</i>	

\*\* Note: Map Unit list adapted from DEC Interpretive Guidelines for the Native Vegetation Maps of the Cumberland Plain, Western Sydney, 2002.

## Appendix 5

### Vegetation description DEC Mapping 2002

#### 11. Alluvial Woodland

River Flat Forest contains a number of tree species which may dominate at different sites. However, no species in the upper tree stratum was recorded in more than 50% of the sample sites. The two most common species are *Eucalyptus amplifolia* and *E. tereticornis*, with *Angophora floribunda* occurring slightly less frequently. Map Unit 11 often includes a stratum of small trees, frequently including *Acacia parramattensis* subsp. *parramattensis*, and less frequently *Casuarina glauca*, and sometimes *Angophora floribunda* and *Melaleuca linariifolia*. A shrub stratum is usually evident, but is often sparse and invariably dominated by *Bursaria spinosa*. Map Unit 11 often has a dense ground cover dominated by grasses such as *Oplismenus aemulus*, *Microlaena stipoides* var. *stipoides*, *Entolasia marginata* and *Echinopogon ovatus*. Herb species are also common, including *Solanum prinophyllum*, *Pratia purpurascens* and *Commelina cyanea*.

Map Unit 11 occurs exclusively along, or in close proximity to minor watercourses draining soils derived from Wianamatta Shale. It is the most common community found on soils of recent alluvial deposition. Map Unit 11 is also found on the floodplains of the major watercourse, the Hawkesbury-Nepean River, but grades into Map Unit 12 (Riparian Forest) on the terraces immediately adjacent to the river.

#### Previous Floristic Classifications:

River Flat Forest as described by Benson (1992), (Map Unit 9f), is herein divided into three separate communities: Map Unit 11 (River Flat Forest), Map Unit 12 (Riparian Forest) and Map Unit 5 (Riparian Woodland). Map Units 11 and 12 correspond to the major groupings 'Cumberland Plain Creek Systems' and 'Hawkesbury-Nepean River and major Tributaries' defined by DEC (1997). Map Unit 5 was included as a component of the riverine vegetation by both Benson (1992) and DEC (1997). 'Forest Red Gum – Cabbage Gum Forest', 'Forest Red Gum – Blue Gum Forest' and 'Swamp Oak Forest' (*sensu* DEC 1997) are included in Map Unit 11. The NSW Threatened Species Act (1995) lists 'Sydney Coastal River Flat Forest' as an endangered ecological community. Map Units 11 and 12 fall within the definition of this listed community. 'Camden White Gum Forest' as described by Benson (1992), (Map Unit 6d), is included within Map Unit 12.

**Diagnostic Species**

<b>Trees</b>		
<i>Angophora floribunda</i>	<i>Acacia parramatensis</i>	<i>Commelina cyanea</i>
<i>Angophora subvelutina</i>		<i>Lomandra longifolia</i>
<i>Eucalyptus amplifolia</i>	<b>Shrubs</b>	<i>Oxalis perennans</i>
<i>Eucalyptus baueriana</i>	<i>Bursaria spinosa</i>	<i>Alisma plantago-aquatica</i>
<i>Eucalyptus deanei</i>		<i>Samolus valerandi</i>
<i>Eucalyptus elata</i>	<b>Ground Covers</b>	<i>Bolboschoenus caldwellii</i>
<i>Eucalyptus eugenioides</i>	<i>Desmodium varians</i>	<i>Centipeda cunninghamii</i>
<i>Eucalyptus globoidea</i>	<i>Brunoniella australis</i>	<i>Cyperus trinervis</i>
<i>Eucalyptus piperita</i> subsp. <i>Piperita</i>	<i>Oplismenus aemulus</i>	<i>Lomandra multiflora</i>
<i>Eucalyptus punctata</i>	<i>Entolasia marginata</i>	<i>Entolasia stricta</i>
<i>Eucalyptus sclerophylla</i>	<i>Echinopogon ovatus</i>	<i>Microlaena stipoides</i>
<i>Eucalyptus tereticornis</i>	<i>Solanum prinophyllum</i>	<i>Themeda australis</i>
<i>Casuarina cunninghamiana</i>	<i>Pratia purpurascens</i>	<i>Glycine tabacina</i>

\*\* Note: Map Unit list adapted from DEC Interpretive Guidelines for the Native Vegetation Maps of the Cumberland Plain, Western Sydney, 2002.



## Appendix 6

### Community Engagement Strategy

#### Benefits of involving the community in managing their natural environment

Engaging the community in native vegetation management and restoration has many benefits for the local environment and the community. Greening Australia has been involved in community-based activities for many years and has witnessed the value people hold for their local environment when they interact with it. The involvement of the local community gives them a feeling of “ownership” over their bushlands and as such is more concerned about its protection.

The community can be involved in a range of activities to help protect and restore their native bushland. Activities such as revegetation of native trees and plants, bush regeneration, weed control and rubbish removal can all assist in the quality of our native vegetation. These activities also provide the ideal forum for the local community to learn more about their environment and the importance of its conservation.

#### Strategy

Our experience in engaging the community in native vegetation restoration has enabled us to develop a very targeted approach for new developments. Our engagement strategy can be broken down into 4 basic principles;

##### 1. Initial education

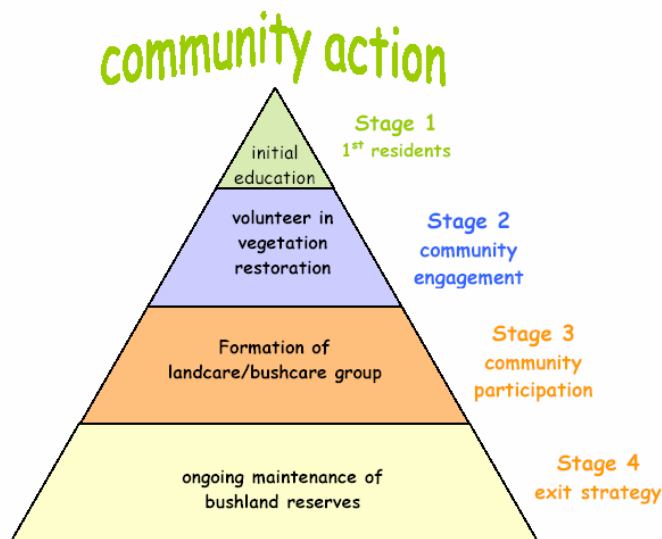
This involves providing the community with the appropriate education tools and resources to learn about the sustainability principles being initiated in the proposed development. It is only when the correct knowledge is provided that the community will embrace the sustainability principles

Educational packages can include;

- Benefits of effective local environments and ecosystems
- Native vegetation restoration techniques
- Opportunities to engage in sustainability
- Indigenous and cultural education in native vegetation management
- Programs to involve schools

## 2. Volunteer activities

The second component of our strategy involves engaging the community in restoration activities that provide educational and learning opportunities. Examples of this include delivering training workshops, for example Seed Collection Techniques, as the opening activity of the community seed collection day.



## 3. Formation of a Landcare/Bushcare group

By providing the above mentioned community activities, training and education certain members of the community will wish to become involved in a regular program of bush regeneration and maintenance. These activities are usually planned on a monthly or bi-monthly basis with the community beginning to drive the work program themselves. At this stage the formation of a dedicated group enables the community to keep focused, have a voice for raising environmental issues and exchange knowledge and

information with other Landcare or similar groups.

## 4. On-going management of bushland areas

Finally GANSW will put together an on-going Plan of Management for the bushland areas to give guidance to the Landcare group. This usually forms part of the exit strategy of the site.

Experience has shown that it is important for the community to have a focal point for their activities. The development includes a proposed community nursery and GANSW would welcome the opportunity of designing this facility to include community engagement activities. The facility could host community engagement activities such as workshops on plant identification, propagation, bush regeneration, seed collection, composting, recycling, sustainable living etc.



Other community engagement activities may include;

- Tree planting days
- Regular bush regeneration activities
- Seed collection events
- Guided walks in bushland areas (night & day)
- Education activities

## Appendix 7

### Noxious weeds list for the Penrith LGA

### Noxious Weeds in NSW

#### Hawkesbury River County Council

The following weeds are declared noxious in the Hawkesbury River County Council control area (**including Baulkham Hills, Blacktown, Hawkesbury and Penrith council areas**). The 'details' link on each listing provides further information on the legal requirements of the weed's listing and any variation in status within the local control area.

<b>Common name</b>	<b>Scientific name</b>	<b>Category</b>
African boxthorn	<i>Lycium ferocissimum</i>	W2
Alligator weed	<i>Alternanthera philoxeroides</i>	W1
Bathurst Noogoora Californian Cockle burrs	<i>Xanthium spp.</i>	W3
Black knapweed	<i>Centaurea nigra</i>	W1
Blackberry	<i>Rubus fruticosus (agg. spp.)</i>	W3
Broomrape	<i>Orobanche spp.</i>	W1
Cabomba	<i>Cabomba spp.</i>	W4g
Columbus grass	<i>Sorghum x almum</i>	W2
Crofton weed	<i>Ageratina adenophora</i>	W2
Dodder	<i>Cuscuta campestris</i>	W2
Giant Parramatta grass	<i>Sporobolus fertilis syn. Sporobolus indicus var. major</i>	W2
Green cestrum	<i>Cestrum parqui</i>	W2
Harrisia cactus	<i>Harrisia spp.</i>	W4f
Hawkweed	<i>Hieracium spp.</i>	W1
Horsetail	<i>Equisetum spp.</i>	W1
Johnson grass	<i>Sorghum halepense</i>	W2
Karoo thorn	<i>Acacia karroo</i>	W1
Kochia	<i>Kochia scoparia</i>	W1
Lagarosiphon	<i>Lagarosiphon major</i>	W1
Ludwigia	<i>Ludwigia peruviana</i>	W2
Mexican feather grass	<i>Nassella tenuissima syn Stipa tenuissima</i>	W1
Miconia	<i>Miconia spp.</i>	W1

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Mother-of-millions	<i>Bryophyllum delagoense</i>	W2
Pampas grass	<i>Cortaderia spp.</i>	W2
Parthenium weed	<i>Parthenium hysterophorus</i>	W1
Paterson's Italian bugloss	curse, Vipers <i>Echium spp.</i>	W3
Pellitory	<i>Parietaria judaica</i>	W3
Prickly pears	<i>Opuntia spp.</i>	W4f
Privet - broadleaf	<i>Ligustrum lucidum</i>	W4b
Privet - narrowleaf	<i>Ligustrum sinense</i>	W4b
Rhus tree	<i>Toxicodendron succedaneum</i>	W2
Salvinia	<i>Salvinia molesta</i>	W2
Senegal tea plant	<i>Gymnocoronis spilanthoides</i>	W1
Siam weed	<i>Chromolaena odorata</i>	W1
Spiny burrgrass	<i>Cenchrus incertus</i>	W2
Spiny burrgrass	<i>Cenchrus longispinus</i>	W2
Spotted knapweed	<i>Centaurea maculosa</i>	W1
St John's wort	<i>Hypericum perforatum</i>	W2
Water hyacinth	<i>Eichhornia crassipes</i>	W2
Water lettuce	<i>Pistia stratiotes</i>	W1
Willows	<i>Salix spp.</i>	W4g

Taken from NSW Agriculture noxious weeds in NSW list

## Appendix 8

### Weed control techniques

Common Name	Botanical Name	Status	Removal Techniques
African love grass	<i>Eragrostis curvula</i>	Environmental Weed	Slash or mow before it sets seed along roads and in highly disturbed areas. Spot spray with diluted 1:100 Roundup. Hand remove isolated plants.
Dodder	<i>Cuscuta sp.</i>	Environmental Weed	Hand remove.
Balloon vine	<i>Cardiospermum grandiflorum</i>	Environmental Weed	Hand remove or cut and paint base of stems with undiluted Roundup after removing and bagging fruit. Cut vine curtains at chest height and treat as above and leave hanging in trees.
Blackberry	<i>Rubus fruticosus</i> agg. Spp.	Noxious Weed W2	Cut and paint crown/lignotuber with undiluted Roundup or Garlon and diesel immediately for isolated plants. Slash large populations and spray re-growth with selective herbicide Garlon, Grazon or Brushoff at flowering/fruitlet stage.
Bridal Creeper	<i>Myrsiphyllum asparagoides</i>	Environmental Weed	Hand remove (i.e. by crowning with a knife) isolated plants after removing and bagging fruit. Spray large populations with Brushoff at flowering stage.
Camphor laurel	<i>Cinnamomum camphora</i>	Environmental Weed	Cut and paint base of trunk or drill/chisel trunk (>10 cm diameter) and inject with undiluted Roundup immediately. The "chisel and inject" method may also be preferred in inaccessible sites or in fauna habitat areas. Hand remove seedlings.
Cobblers peg	<i>Bidens pilosa</i>	Environmental Weed	Spot spray with diluted 1:100 Roundup. Best done before it sets seed. Hand

			remove isolated plants.
Crofton weed	<i>Ageratina adenophora</i>	Environmental Weed	Hand remove or spray with 1:100 Roundup.
Fireweed	<i>Senecio madagascariensis</i>	Environmental Weed	Spot spray with diluted 1:100 Roundup. Best done before it sets seed. Hand remove isolated plants.
Fleabane	<i>Conyza spp.</i>	Environmental Weed	Spot spray with diluted 1:100 Roundup. Best done before it sets seed. Hand remove isolated plants.
Green cestrum	<i>Cestrum parqui</i>	Noxious Weed W2	Stem scrape and paint with Garlon and diesel (i.e. both sides of stem) immediately at flowering stage. Remove and bag fruit.
Inkweed	<i>Phytolacca octandra</i>	Environmental Weed	Hand remove or cut and paint base with undiluted Roundup after removing and bagging fruit.
Kikuyu	<i>Pennisetum clandestinum</i>	Environmental Weed	Spot spray with diluted 1:100 Roundup.
Lantana	<i>Lantana camara</i>	Noxious Weed W2	Cut and paint base of trunks with undiluted Roundup immediately. Slash Lantana stems into 2x2 metre piles. Treatment of re-growth may be necessary as layering stems may re-shoot. Hand remove seedlings.
Large leaf privet	<i>Ligustrum lucidum</i>	Environmental Weed	Cut and paint base of trunk or drill/chisel trunk (>10cm diameter) and inject with undiluted Roundup immediately before fruiting stage. Hand remove or spot spray seedlings with 1:100 Roundup.
Madiera winter cherry	<i>Solanum pseudocapsicum</i>	Environmental Weed	Stem scrape and paint with Garlon and diesel (i.e. both sides of stem) immediately at flowering stage. Remove and bag fruit.
Moth plant	<i>Arauja sericifolia</i>	Environmental Weed	Hand remove or cut and paint base of stems with undiluted Roundup after removing and bagging fruit.
Paddy's lucerne	<i>Sida rhombifolia</i>	Environmental Weed	Hand remove or cut and paint base with undiluted Roundup. Slash large populations and spray re-growth with 1:100 Roundup.

Pampas grass	<i>Cortaderia spp.</i>	Noxious Weed W2	Spot spray with diluted 1:70 Roundup after removing and bagging fruit/flowering stems.
Paspalum	<i>Paspalum dilatatum</i>	Environmental Weed	Spot spray with diluted 1:100 Roundup.
Prickly pear	<i>Opuntia spp.</i>	Noxious Weed W4f	Mattock/hand remove all parts of plant.
Boneseed	<i>Chrysanthemoides monilifera</i>	Environmental Weed	Spray actively growing plants, spray to wet all foliage. Spray Roundup at a ratio of 1:100.
Scotch thistle	<i>Onopordum acanthium</i>	Environmental Weed	Spot spray with diluted 1:100 Roundup. Best done before it sets seed. Hand remove isolated plants.
Broom	<i>Spp.</i>	Environmental Weed	Spray with Garlon 600 Herbicide.
Silky oak	<i>Grevillea robusta</i>	Environmental Weed	Cut and paint base of trunk or drill/chisel trunk (>10cm diameter) and inject with undiluted Roundup immediately. Hand remove seedlings.
Small leaf privet	<i>Ligustrum sinense</i>	Environmental Weed	Cut and paint base of trunk or drill/chisel trunk (>10cm diameter) and inject with undiluted Roundup immediately before fruiting stage. Hand remove or spot spray seedlings with 1:100 Roundup. Treatment of re-growth may be necessary as the plant has the ability to sucker from roots.
Sowthistle	<i>Sonchus oleraceus</i>	Environmental Weed	Spot spray with diluted 1:100 Roundup. Best done before it sets seed. Hand remove isolated plants.
Verbena	<i>Verbena spp.</i>	Environmental Weed	Spot spray with diluted 1:100 Roundup. Best done before it sets seed.
Wandering jew	<i>Tradescantia fluminensis</i>	Environmental Weed	Spot spray with 1:50 Roundup or Starane. It is photo-inhibited so should be treated on overcast days after rain. Rake and hand remove all stem fragments in small populations amongst native species.
Mother of millions	<i>Kalanchoe tubiflora</i>	Environmental Weed	Remove by hand, bag all plant material and dispose of in appropriate manner.





## APPENDIX C Restrictive Covenant for Biodiversity

### Restriction on use of land and right of access

1. The owner of the lot burdened must not carry out any act on the Site which may adversely affect any native fauna or native plants or their habitats on the Site, including, without limitation:
    - (a) developing the Site;
    - (b) destroying or causing the destruction or removal of any native plants on the Site; or
    - (c) destroying or causing the destruction or removal of any native fauna on the Site.
  2. The Authority Benefited, and any person who, or authority which, is expressly authorised by the Authority Benefited, may, upon giving reasonable notice to the owner of the lot burdened:
    - (a) by any reasonable means pass across the lot burdened, but only within the Site, for the purpose of:
      - (i) inspecting the Site to ensure due compliance by the owner of the lot burdened with paragraph 1 of this restriction; and
      - (ii) maintaining the Site in accordance with the Plan of Management; and
    - (b) do anything reasonably necessary for that purpose, including:
      - entering the Site;
      - taking anything onto the Site; and
      - carrying out work within the Site.
  3. In exercising its powers under paragraph 2 of this restriction, the Authority Benefited must, at its own cost:
    - (a) ensure all work is done properly;
    - (b) cause as little inconvenience as is reasonably practicable to the owner and any occupier of the lot burdened;
    - (c) cause as little damage as is practicable to the Site and any improvement on it;
    - (d) restore the Site as nearly as is practicable to its former condition; and
    - (e) make good any collateral damage.
  3. For the purpose of this restriction:

**“Authority Benefited”** means the Department of Planning.

**“native fauna”** means any animal-life that is indigenous to New South Wales or is known to periodically or occasionally migrate to New South Wales, whether vertebrate or invertebrate and in any stage of biological development, but does not include:

    - (a) humans; or
-

(b) fish within the meaning of the *Fisheries Management Act 1994* (NSW);  
and

**"native plan"** has the same meaning as in Section 5 of the *National Parks & Wildlife Act 1974* (NSW).

**"Plan of Management"** means a plan of management prepared by the Authority Benefited providing for a scheme of operations for the protection of native plants and native fauna on the Site.

**"restriction"** means this restriction on use of land and right of access.

**"Site"** means that part of the lot burdened subject to this restriction.