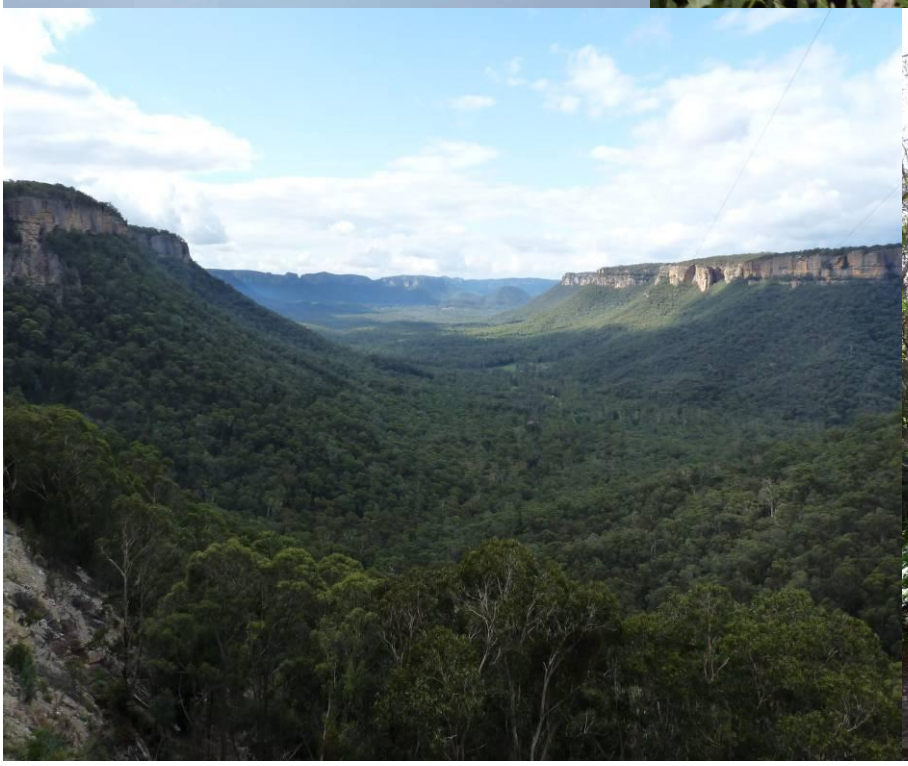
BLACKFELLOWS HAND RESERVE (Maiyingu Marragu)

Management and Biodiversity Plan

Prepared for
Mingaan Aboriginal Corporation

20 May 2013



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Abbreviations

ABBREVIATION	DESCRIPTION
AP	Aboriginal Place, as defined under the NPWS Act 1974
CL Act	NSW *Crown Land Act 1989*
EPBC	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
HNCMA	Hawkesbury Nepean Catchment Management Authority
LGA	Local Government Area
NES	Matters of National Environmental Significance, as listed under the EPBC Act
NPW Act	NSW *National Parks and Wildlife Service 1974*
NW Act	NSW *Noxious Weeds Act 1994*
OEH	NSW Office of Environment and Heritage
TSC Act	NSW *Threatened Species Conservation Act 1995*

1 Introduction and Background

This Plan of Management (hereafter known as the Plan) has been prepared by Eco Logical Australia (ELA). The Plan was funded by the Hawkesbury-Nepean Catchment Management Authority through the Small Aboriginal Grants Indigenous Community Engagement Program. Eco Logical Australia were engaged by Mingaan Aboriginal Corporation.

The study area is Crown Land (listed under the *Crown Lands Act 1989* (CL Act)), and is under the care, control and management of Lithgow City Council, under this Act.

The Plan identifies management options and actions to improve environmental values, within the area of Blackfellows Hands Reserve, a declared Aboriginal Place under the *National Parks and Wildlife Act 1974*. The reserve is on Wolgan Rd, approximately 8kms north of Lidsdale, NSW, in the Lithgow City Council Local Government Area (LGA) (**Figure 1**).

The two adjoining lots assessed as part of this management plan are, Lot 7001/DP 1055079 and Lot 7006 // DP 1055080. For the purpose of this Plan, these two lots are collectively referred to as the study site (refer to **Figure 2**).

1.1 OBJECTIVES OF THE PLAN

This Plan will assess the biodiversity values of the study site, identify management issues within the site and make recommendations to address these issues. The objectives of the Plan are:

- to assess the ecological values and conservation significance of the study site
- to assess threats and impacts to the ecological and cultural values of the study site
- to make recommendations to address these threats and impacts
- to map and assess the vegetation within the study site
- to provide and prioritise management recommendations for the site.

1.2 STAKEHOLDERS

The stakeholders for the Plan are:

- Lithgow City Council: are responsible for the 'care, control and management' of the study site as authorised under the CL Act, and currently are the primary land managers of the study site.
- Department of Trade and Investment – Crown Lands: the study site is a crown land reserve, with 'care, control and management' delegated to Lithgow City Council.
- Forestry Corporation of NSW: a portion of the study site to the west of Wolgan Rd is within Ben Bullen State Forest, and Newnes State Forest abuts the study site along the eastern boundary.
- Office of Environment and Heritage (OEH): the regulatory authority responsible for the NPW Act and consequently the nomination, assessment and declaration of Aboriginal Places. Also responsible for licensing/approvals for any activities that may impact on threatened biodiversity.

- Aboriginal interests including, but not limited to, Wiradjuri Council of Elders, Mingaan Aboriginal Corporation, Land Councils, and others as may be identified.
- Hawkesbury-Nepean Catchment Management Authority (HNCMA): grant funding for management plan provided by HNCMA, and an interest in the management of riparian areas of the site and potential funding resource for future management actions within these lands.
- Centennial Coal: who currently operate an underground coal mining lease below the study site
- Adjoining land owners
- Rural Fire Service
- Recreational users

1.3 ADJOINING LAND TENURE

The study site is bordered by both private and public land holders/managers (**Figure 3**). The land holders/managers are:

- State Forest:
  - Newnes
  - Ben Bullen
- Crown land
  - Angus Place Waste Facility
- Private property

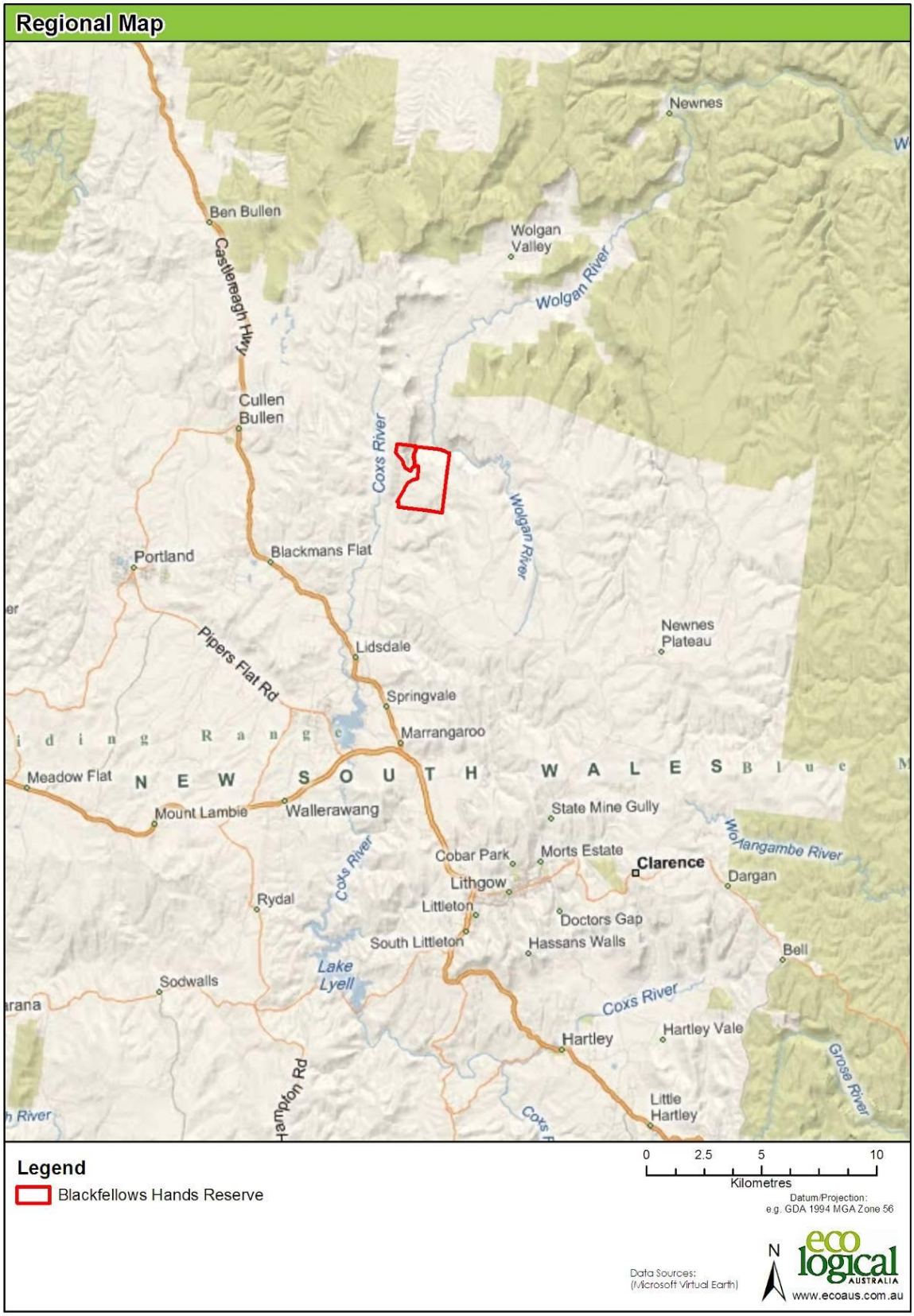

Figure 1: Regional context of the Blackfellows Hands Reserve (i.e. the study site).

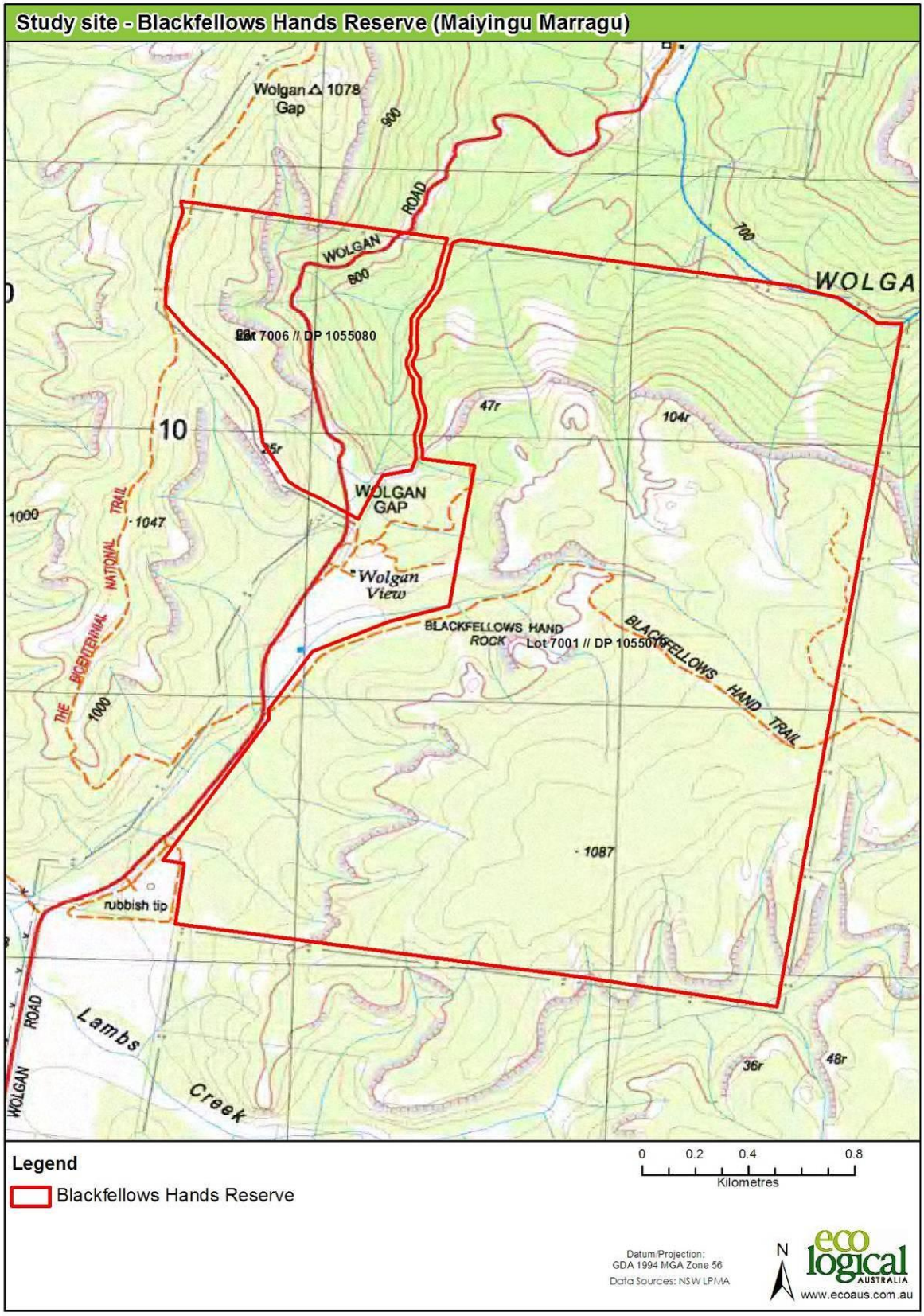

Figure 2: Cadastral and topographic layout of Blackfellows Hands Reserve.

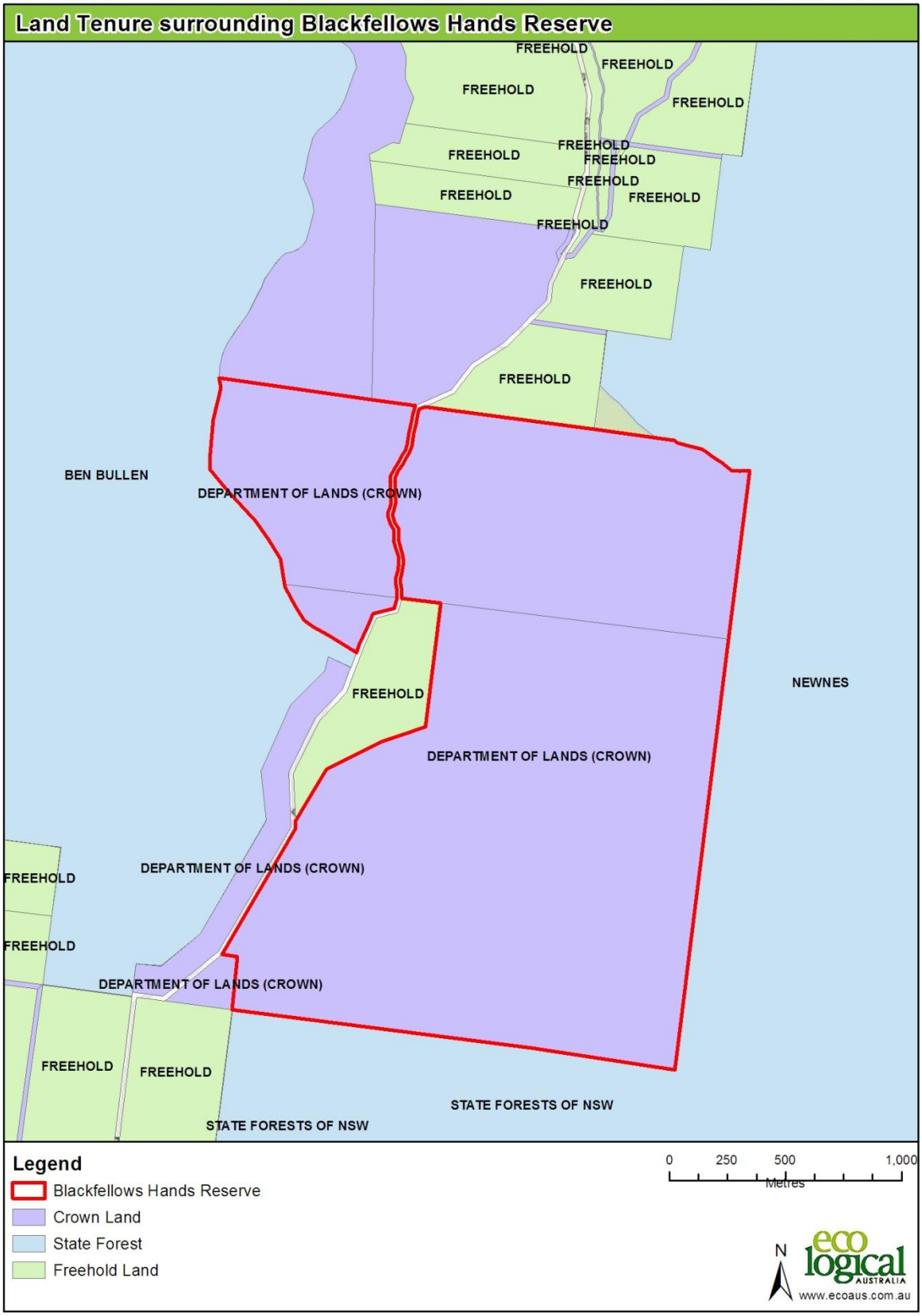

Figure 3: Tenure of land parcels surrounding the Blackfellows Hands Reserve

1.4 PLANNING ENVIRONMENT

1.4.1 Local

The study site is located within the Lithgow City Council LGA and falls within the jurisdiction of the *Lithgow City Local Environmental Plan 1994 (*Lithgow LEP).

Pursuant to the Lithgow LEP - 1994, the land is currently zoned 1 (a) –Rural (General), the objectives of this zone is to promote the proper management and utilisation of natural resources by:

(a) protecting, enhancing and conserving:

(i) rural land, in particular prime crop and pasture land, in a manner which sustains its efficient and effective agricultural production potential,

(ii) soil, by controlling and locating development in accordance with soil capability,

(iii) forests of existing and potential commercial value for timber production,

(iv) valuable deposits of minerals, coal and extractive materials, by controlling the location of development for other purposes in order to ensure the efficient extraction of those deposits,

(v) trees and other vegetation in environmentally sensitive areas, where the conservation of the vegetation is significant for scenic amenity or natural wildlife habitat or is likely to control land degradation,

(vi) water resources for use in the public interest, preventing the pollution of water supply catchment and major water storages,

(vii) localities of significance for nature conservation, including places with rare plants, wetlands and significant wildlife habitat, and

(viii) items of heritage significance,

(b) preventing the unjustified development of prime crop and pasture land for purposes other than agriculture,

(c) facilitating farm adjustments,

(d) minimising the cost to the community of:

(i) fragmented and isolated development of rural land, and

(ii) providing, extending and maintaining public amenities and services,

(e) providing land for other non-agricultural purposes, in accordance with the need for that development, and

(f) providing for the separation of conflicting land uses.

Development without consent in this zone is permissible for the purpose of agriculture (other than intensive livestock keeping establishments or ancillary dwellings); bushfire hazard reduction; forestry (other than ancillary dwellings); home-based child care.

Prohibited development for the purpose of boarding houses; bulky goods salesrooms or showrooms; commercial premises; home occupation (sex services); motor showrooms; residential units; restricted

premises; sex services premises; shops (other than general stores).

Consent is required for any development except that permitted without consent or prohibited.

1.4.2 State

Crown Lands Act 1989

The study area is Crown Land (listed under the *Crown Lands Act 1989*), and is under the care, control and management of Lithgow City Council, under this Act.

National Parks and Wildlife Act 1974

The study area is also a declared Aboriginal Place under section 84, *National Parks and Wildlife Act 1974*. The Director-General of the Department of Premier and Cabinet, is the authority for the protection of Aboriginal places in New South Wales. In particular, the Director-General is responsible for the proper care, preservation and protection of any Aboriginal object or Aboriginal place on any land reserved under this Act. Administration of this Act is effected by the NSW Office of Environment and Heritage.

Threatened Species Conservation Act 1995

The NSW *Threatened Species Conservation Act 1995* (TSC Act) aims to protect and encourage the recovery of threatened species, populations and ecological communities listed under the Act. This management plan identifies species, populations and ecological communities that are listed under this Act that were either recorded or are likely to utilise the site throughout the year.

Fisheries Management Act 1994 (FM Act)

The *Fisheries Management Act 1994* (FM Act) aims to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. The FM Act defines 'fish' as any marine, estuarine or freshwater fish or other aquatic animal life at any stage of their life history, excluding whales, mammals, reptiles, birds, amphibians or specifically excluded species. No threatened fish species, or endangered populations are known to occur within the study area.

Noxious Weeds Act 1993

The *Noxious Weeds Act 1993* (NW Act) defines the roles of government, councils, private landholders and public authorities in the management of noxious weeds. The Act sets up categorisation and control actions for the various noxious weeds, according to their potential to cause harm to our local environment.

The objectives of the NW Act include:

- to identify noxious weeds in respect of which particular control measures need to be taken;
- to specify those control measures;
- to specify the duties of public and private landholders as to the control of those noxious weeds; and
- to provide a framework for the State-wide control of those noxious weeds by the Minister and local control authorities.

Under this Act, noxious weeds have been identified for Local Government Areas and assigned Control

Categories (e.g. 1, 2, 3, 4 and 5). Part 3 of the NW Act provides that occupiers of land have responsibility for controlling noxious weeds on the land they occupy. Pursuant to section 13 (1), Lithgow City Council must control noxious weeds on the land as required under the weed control order, to the extent necessary to prevent the weeds from spreading to adjoining land.

1.4.3 Commonwealth

Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a process for assessing the environmental impact of activities and developments where 'matters of national environmental significance' (NES) may be affected. The eight matters of national environmental significance protected under the EPBC Act are:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines)

Under the Act, any action which "has, will have, or is likely to have a significant impact on a matter of national environmental significance" is defined as a "controlled action", and requires approval from the Commonwealth Department of the Sustainability, Environment, Water, Population, and Communities (DSEWPC), which is responsible for administering the EPBC Act.

This report highlights any EPBC Matters of NES.

1.5 METHODOLOGY FOR THE PREPARATION OF THE PLAN

The preparation of this Plan has involved data gathering and analysis phases. Four main elements of data gathering were employed as follows:

- A review of relevant literature pertaining to the study site and surrounds;
- Diurnal surveys of the study site to provide an understanding of the landforms, the vegetation and habitats, threatening processes, and the nature of the appropriate management strategies and actions;
- Nocturnal surveys to spotlight any birds, bats and arboreal and ground-dwelling mammals actively foraging within the study area; and
- Consultation with Mingaan AC to establish the cultural values of the study site and, in the context of the cultural and biodiversity values, and other potential options for the study site, to identify management strategies and actions.

The review of relevant literature undertaken prior to the commencement of field studies, involved:

- Available literature and documents including relevant flora and fauna studies, environmental planning instruments, recovery plans, topographic maps, aerial photographs

and other plans pertaining to the study site; and

- Searching the OEH Atlas of NSW Wildlife and EPBC protected matters database for flora and fauna species recorded in the locality, including threatened species.

An initial site reconnaissance was undertaken with Sharon Riley, Mingaan AC, on the 9th of February 2011, with follow up surveys undertaken between the 28th and 30th of March, 2011. These surveys focused on identifying and mapping vegetation types and condition within the study site, some targeted fauna survey (ultra-sonic bat detection and spotlighting), as well as opportunistic fauna observations (**Figure 4**). Vegetation types and conditions were mapped consistent with, Vegetation of the Western Blue Mountains (DEC 2006).

Locations of flora and fauna survey locations, management issues and opportunistic records, were recorded during survey using a handheld GPS. **Table 1** outlines the prefix appointed to each GPS location during field survey. **Figure 4** displays these points and tracks over an aerial photograph of the study site.

The consultation with Mingaan AC was undertaken as part of the field survey and involved the following activities;

- A tour of the study site with Sharon Riley at which cultural values were identified and management strategies discussed; and
- Input and review of the draft and final Plan.

Table 1: Location and details of management issues and survey points as identified on Figure 3.

Details	ID
Management Issues	
Asbestos	AB1
Erosion	M1, M2
Off tracks	M2, M4, M5, M6, M7, M8, M9, M11, M12, M15, M16.
Noxious weed incursions	M13, M17, M18
Rubbish dumping	M14, M19
Trail bike impacts	M3, M4
Survey points	
Anabat – Location of ultra-sonic bat recorders	A1, A2, A3, A4
Call Playback Sites	C1, C2
Rapid Assessment Points	R1 – R9
Spotlighting start points	S1, S2
Vegetation survey	Q1, Q2, Q3
Opportunistic records	
Heathland	Heath1 – 3
Opportunistic Pagoda	Pagoda

Each of these disturbances and management actions to remediate disturbed areas are discussed further in **Sections 5** and **6**.

Note that field assessment for this management plan was undertaken almost 2 years prior to finalisation, and as such additional management issues may have arisen during this period or management issues identified hereafter may been addressed by Lithgow City Council and/or Forests NSW in the intervening period.

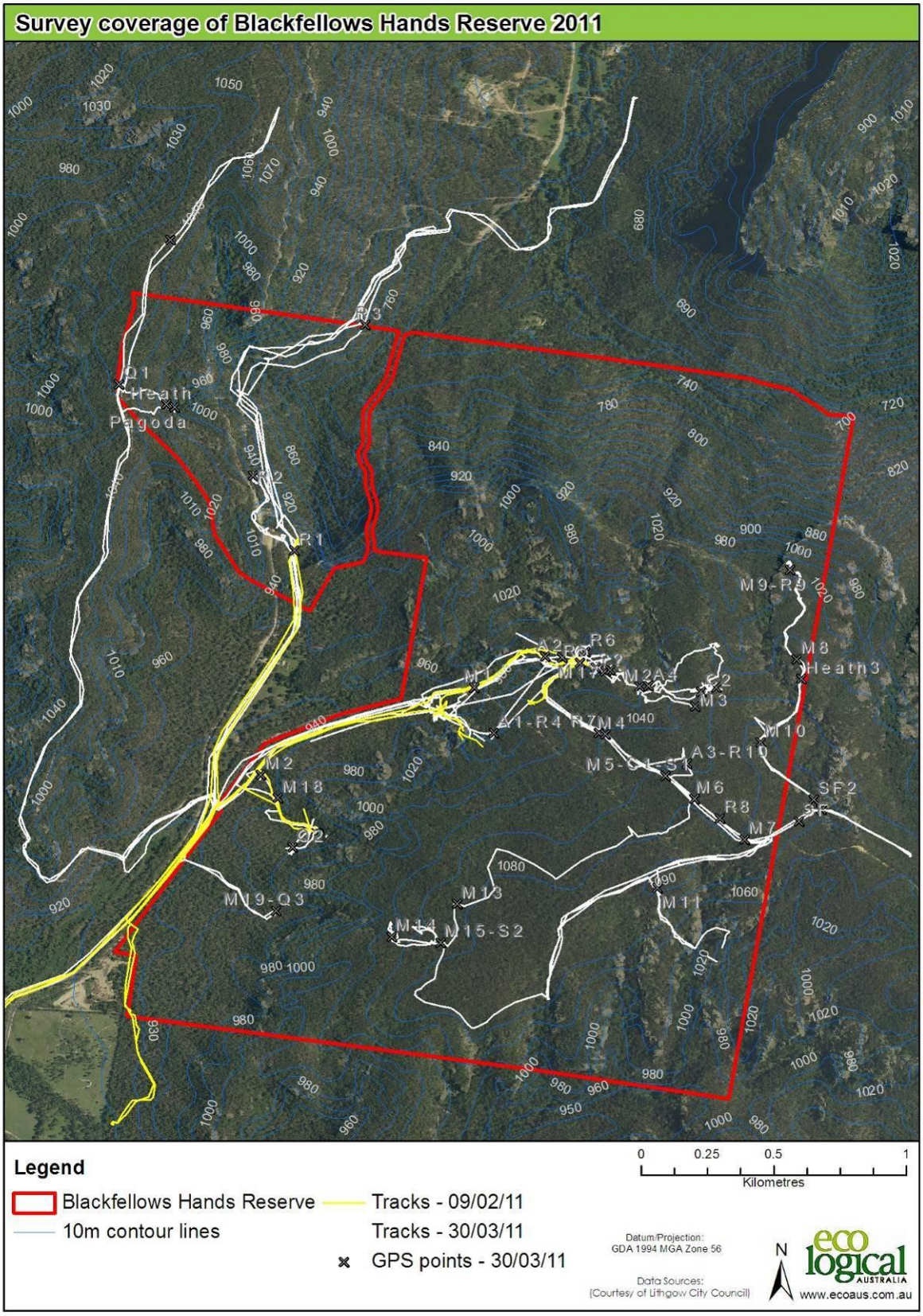

Figure 4: Field survey map, including location of management issues

* See **Table 1** for detail on survey points.

2 Ecological Assessment

2.1 TOPOGRAPHY, GEOLOGY, AND SOILS

The study site is an area of approximately 516 hectares (ha) located approximately 8 kilometres (km) north of Lidsdale in the Western Blue Mountains (refer to **Figure 1**). The site consists of a series of sandstone ridges and escarpments, steeply divided by minor drainage lines, with elevation ranging from 690 metres (m) AHD in the north-east of the site to 1090 m AHD in the south-east (**Figure 4**).

The geology of the site consists mainly of Narrabeen Group sandstones, Illawarra Coal Measures towards the northern boundary and some Berry Siltstone in the north east of the site (Raymond and Pogson 1998) (**Figure 5**).

Soil Landscapes are areas of land with unique landform features containing a characteristic set of soils. The site is underlain by four Soil Landscape Groups, consisting of six Soil Landscapes (King 1993) (**Table 2** and **Figure 6**).

Table 2: Soil Landscapes of the Blackfellows Hands Reserve, Wolgan Valley.

Soil Landscape Group	Soil Landscape	Details
Residual	Newnes Plateau (np)	Level to gently undulating wide crests and ridges on plateau surfaces of Triassic Grose Sandstone. Local relief to 20m. Slopes <`0%. Elevation generally >1000m. Infrequent rock outcrop. Soils are acid, highly permeable, stony soils of low fertility, low water holding capacity, high potential aluminium toxicity and localised shallow soils.
Colluvial	Hassan Walls (hw)	Cliffs derived from Narrabeen Group sandstones and steep colluvial talus sideslopes developed over Illawarra Coal Measures and the Shoalhaven Group. Local relief >100m, slopes mostly >40%, elevation 280-1000m.
	Warragamba (wb)	Narrow convex crusts and ridges and steep colluvial sideslopes on Narrabeen Group sandstones with minor cliffs and scarps on steeper slopes. Local relief 80-130m, slopes >35%, elevation mostly <700m. Uncleared tall open-forest. Mass movement hazard, steep slopes, sever water erosion hazard, rock fall hazard, acid stony soils of low fertility, rock outcrop.
Erosional	Cullen Bullen (cb)	Rolling low hills and rises and Illawarra Coal Measures and the Berry Formation. Slopes 10-25%, local relief <50m, elevation 550-1050m. Localised rock outcrop occurs as small isolated low scarps (<5m). Extensively cleared open-woodland and open-forest. Hard setting topsoils, high water erosion hazard, localised mine subsidence district with high run-on.
	Glen Alice (ga)	Rolling rises and low hills on Shoalhaven Group sediments in the Wolgan and Capertee Valleys. Local relief 10-30m, slopes 5-20%, elevation mostly 280-680m. Extensively cleared open-woodland. Hardsetting topsoils, localised sailinity and alkalinity, high water ersion hazard, localised steep slopes, occasional localised flooding.

Soil Landscape Group	Soil Landscape	Details
	Wollongambe (wo)	Rounded convex crests and moderately to steeply inclined sideslopes on Narrabeen Group sandstones. Local relief to 100m, slopes usually <35%, elevation mostly >600m. Localised rock outcrop is common including broken scarps and small rock ledges and cliffs (<25m). Largely uncleared open-woodland and open-forest. High to severe water erosion hazard, steep slopes, shallow soils, low soil fertility.

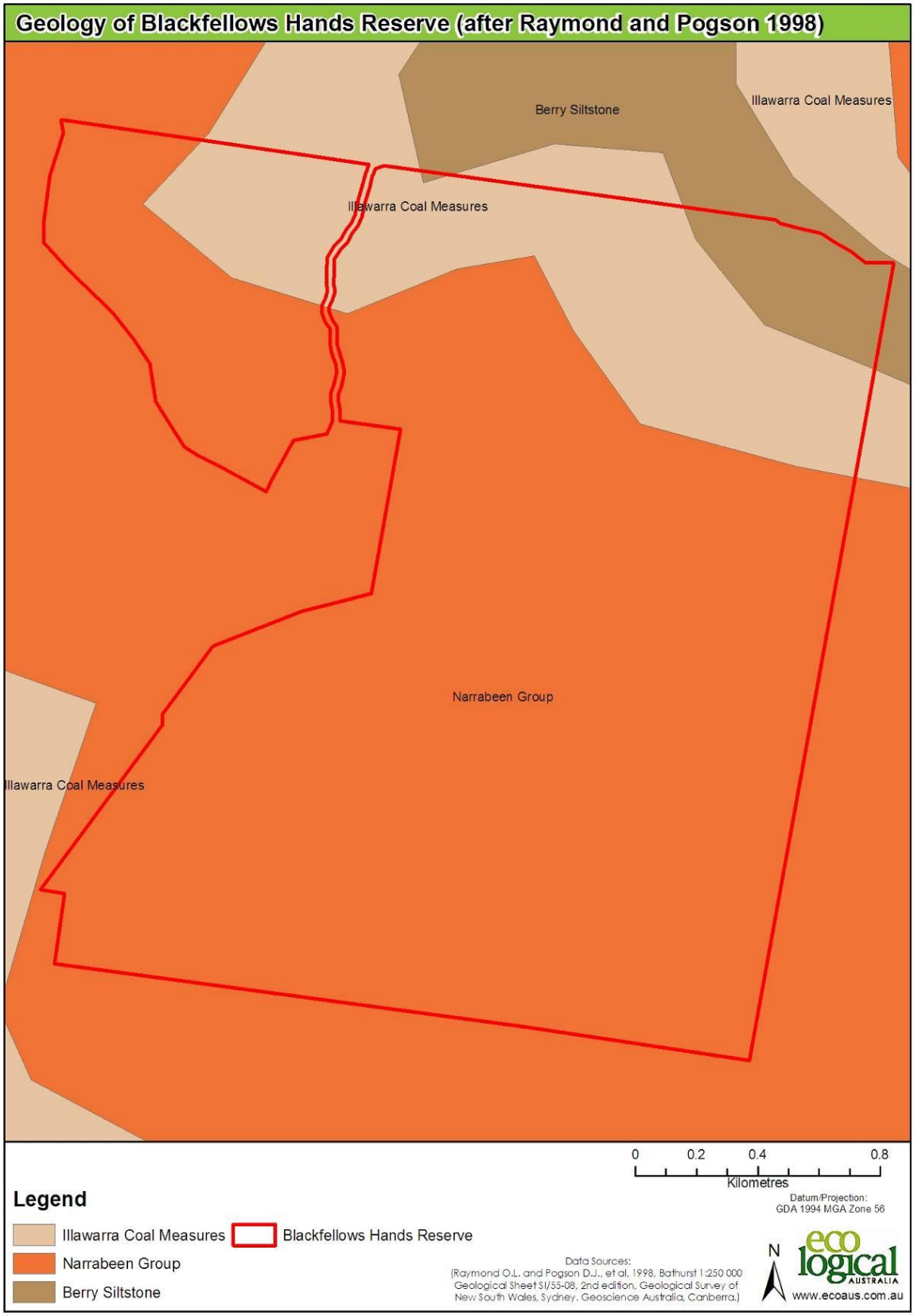

Figure 5: Geology of the Blackfellows Hands Reserve.

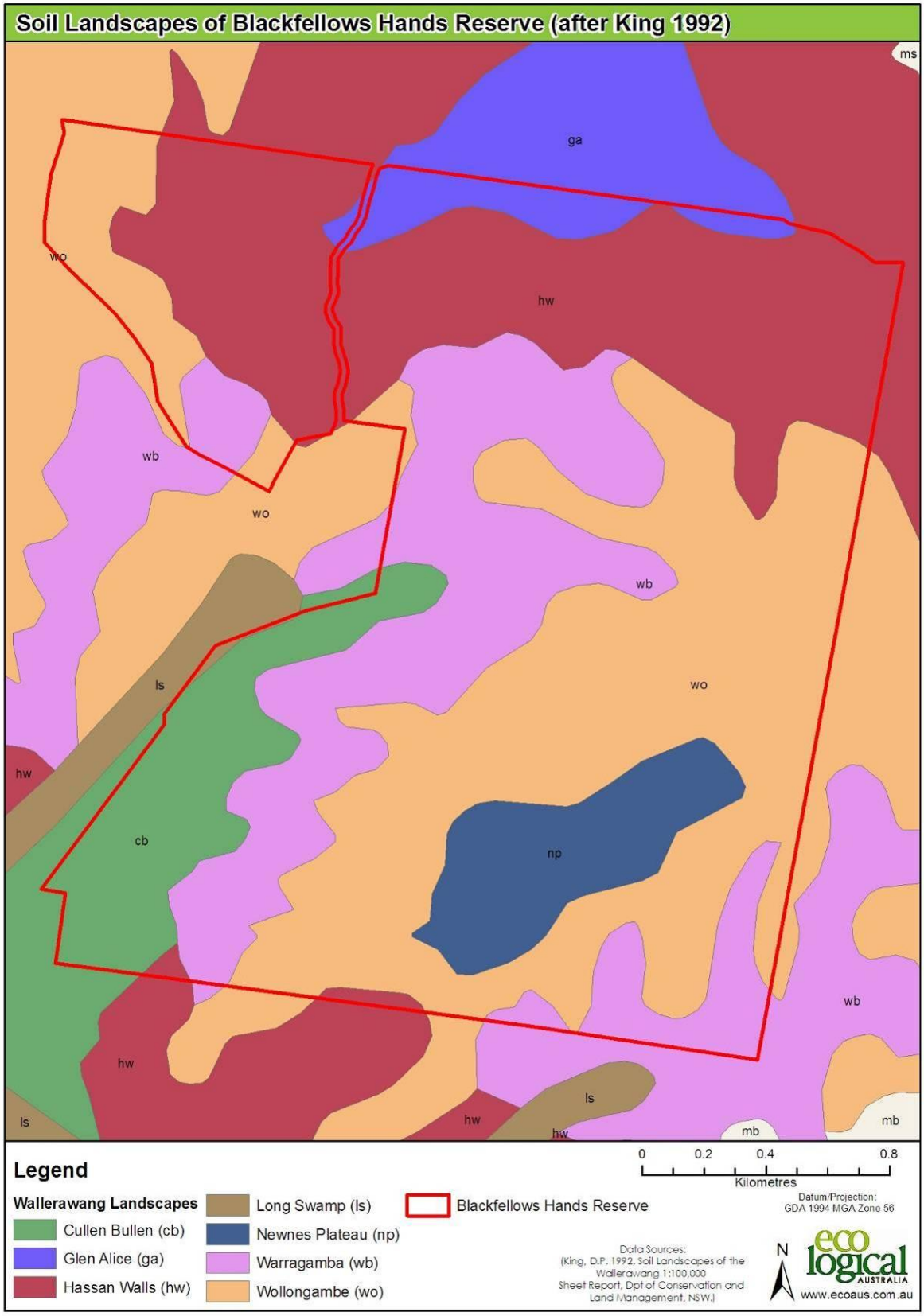

Figure 6: Soil Landscapes of the Blackfellows Hands Reserve.

2.2 VEGETATION

2.2.1 Previous Botanical Studies

The study site is situated in a region that generally has received little detailed attention in terms of botanical surveys in the past, with the exception of broad regional scale mapping. The most recent and comprehensive vegetation map for the area is the South Coast and Illawarra Vegetation Integration (SCIVI) (Tozer etal 2006), though this project did not continue north of Lithgow. Two regional scale mapping exercises are of relevance to the study site, these are:

- Benson and Keith (1992) Vegetation of the Wallerawang 1:100,000 Map Sheet; and
- DEC (2006) The Vegetation of the Western Blue Mountains.

The information provided by these publications is summarized in the following sections.

2.2.2 Vegetation of the Wallerawang 1: 100 000 Map Sheet

The vegetation of the Wallerawang 1: 100 000 Map Sheet area was described by Benson and Keith (1992). At the study site, this vegetation map recognises five vegetation communities (**Figure 7**), which are:

- Unit 9j – Montane Gully Forest;
- Unit 10g – Scribbly Gum – Stringybark Woodland;
- Unit 10h – Tablelands Grassy Woodlands Complex,
- Unit 10i – Tallus-slope Woodland
- Unit 20b – Coxs River Swamps; and
- Unit 21d – Pagoda Rock Complex

Unit 9j - 'Montane Gully Forest'

Open-forest: *Eucalyptus fastigata – Eucalyptus cypellocarpa – Eucalyptus dalrympleana*

Benson and Keith (1990) describe the community as an open-forest of *Eucalyptus fastigata* (Brown Barrel) and *Eucalyptus dalrympleana* subsp. *dalrympleana* (Mountain Gum), found at high elevations (above 850m) on escarpment slopes around Lithgow. It is found in narrow gorges and canyons at the edges of the sandstone plateaux, and at the head of major drainage systems such as the Wolgan and Carne Creeks. These are all sheltered sites and the soils, although of only low to moderate fertility, are moist, well-drained and deep, enriched by colluvial material from the sandstone escarpments above. Tree height now is commonly about 20m, but most of these forests have been logged though there are still pockets of big trees in inaccessible gullies. The main species are *Eucalyptus fastigata* and *Eucalyptus dalrympleana,* though *Eucalyptus oreades* and *Eucalyptus piperita* subsp. *piperita* may also be present on the drier sites. The understorey has a sparse shrub stratum often with *Acacia dealbata*, *Acacia buxifolia*, *Cassinia* sp., *Leptospermum flavescens, Oxylobium ilicifolium* and *Banksia spinulosa* var. *cunninghamii*. Ferns *Pteridium esculentum* and *Blechnum* sp, herbs *Lomandra longifolia, Viola betonicifolia, Stellaria flaccida, Stellaria pungens* and *Acaena novae-zelandiae* and twiners *Clematis aristata* and *Billardiera scandens* make up the continuous groundcover.

Unit 10g - 'Scribbly Gum – Stringybark Woodland'

Woodland of *Eucalyptus rossii – Eucalyptus sparsifolia*

On the drier western aspects of the Triassic sandstone plateau and extending onto Permian sandstones further west is woodland with *Eucalyptus rossii* (Inland Scribbly Gum) and *Eucalyptus sparsifolia* (Narrow-leaved Stringybark). It is particularly common in Ben Bullen State Forest. Rainfall is less than 900mm p.a. and generally, this vegetation occurs on upper ridge slopes where soils are dry, shallow, infertile sandy loams. *Eucalyptus sieberi* (Silvertop Ash) and *Eucalyptus piperita* (Sydney Peppermint) may be found around sandstone outcrops and in small gullies, where soils are slightly deeper and better-drained. Southerly aspects may have *Eucalyptus macrorhyncha* (Red Stringybark).

On the sandstone plateau the understorey is shrubby with *Oxylobium ilicifolium, Acacia buxifolia, Acacia terminalis, Boronia microphylla, Dillwynia phylicoides, Monotoca scoparia, Leucopogon muticus, Brachyloma daphnoides* and *Persoonia linearis*. Groundcover species include *Chionochloa pallida, Lomandra multiflora*, *Lomandra glauca, Pseudognaphalium luteo-album* and *Dianella revoluta.* Where *Eucalyptus rossii* and *Eucalyptus sparsifolia* extend onto Permian sediments this unit intergrades with the 'Tablelands Grassy Woodland Complex' and grasses predominate in the understorey, particularly *Chionochloa pallida* but also with *Agrostis avenacea, Dichelachne rara, Echinopogon ovatus*, *Poa sieberiana* and *Austrostipa* species."

Unit 10h - 'Tablelands Grassy Woodlands Complex'

1. Woodland of *Eucalyptus rossii - Eucalyptus macrorhyncha*
2. Woodland of *Eucalyptus mannifera – Eucalyptus dives*
3. Open-forest of *Eucalyptus dalrympleana*

Benson and Keith note that "This map unit includes a number of communities characteristic of the poorer soils of the Tablelands. It is found on soils derived from Permian shales, conglomerates and sandstones along the western edge of the map sheet from Wallerawang north to Ben Bullen. Soils are yellow, hardsetting, texture-contrast, sandy loam soils (Hamilton 1976).

Species groupings appear to be strongly related to topographic position. On hilly sites, particularly on dry, northern to western aspects, is woodland with *Eucalyptus rossii, Eucalyptus macrorhyncha* and less commonly *Eucalyptus mannifera* subsp. *mannifera* (Brittle Gum). The understorey is open with scattered grasses and occasional shrubs, the amount of cover depending on season and rainfall conditions. The most common grasses include *Chionochloa pallida, Austrodanthonia laevis, Poa sieberiana*, *Poa labillardieri* and *Agrostis avenacea.* Other ground layer species include *Lomandra multiflora, Dianella laevis, Stylidium graminifolium* and *Gonocarpus tetragynus*. There may be shrubs of *Acacia buxifolia, Brachyloma daphnoides, Lissanthe strigosa* and *Hibbertia obtusifolia*. This vegetation often grades into the Scribbly Gum – Stringybark Woodland on adjacent sandstone ridges.

Woodland with *Eucalyptus mannifera* subsp. *mannifera* and *Eucalyptus dives* (Broad-leaved Peppermint) occurs on country of lower relief. The understorey composition here is similar to that associated with *Eucalyptus.rossii*, but ground cover may be more dense. On lower slopes with more shelter and deeper colluvial or alluvial soils is open-forest of *Eucalyptus dalrympleana* subsp. *dalrympleana*, sometimes with *Eucalyptus bridgesiana* or *Eucalyptus viminalis*, the latter particularly along creeklines. These forests usually contain one or more tall shrub/small tree layers, commonly with *Acacia dealbata, Acacia obliquinervia*, *Leptospermum flavescens* and *Eucalyptus* sapling regeneration. Ground cover may be 60-80%, with herbaceous species such as *Dichondra repens*, *Gonocarpus tetragynus, Acaena nova-zelandiae, Viola betonicifolia*, *Glycine clandestina* or frequently may be dominated completely by *Pteridium esculentum,* possibly resulting from frequent burning.

Unit 21d – Pagoda Rock Complex

Benson and Keith (1990) note that this complex comprises three separate vegetation communities, though only one is found on site. This is:

- Woodland dominated by *Eucalyptus piperita* and *Eucalyptus rossii*

The Pagoda Rock Complex comprises the exposed sandstone cliffs, ridges and rocky outcrops on the margins of the plateau escarpments. The rocks are frequently weathered to form striking pagoda-shaped domes.

In sheltered sites there is open-forest of *Eucalyptus piperita* subsp. *piperita*, *Eucalyptus sieberi* and *Eucalyptus oblonga* (Sandstone Stringybark). *Eucalyptus rossii* and *Eucalyptus punctata* (Grey Gum) become more common with greater exposure and in the most exposed situations *Eucalyptus laophila*, *Eucalyptus oreades* (Blue Mountains Ash) and *Eucalyptus rossii* are common.

In the forests and woodlands, the common understorey species include *Acacia terminalis*, *Acacia ulicifolia*, *Acacia obtusifolia, Banksia ericifolia*, *Calytrix tetragona, Phyllota phylicoides, Platysace lanceolata, Boronia microphylla, Isopogon dawsonii, Allocasuarina distyla, Hakea dactyloides* and *Leptospermum sphaerocarpum*.

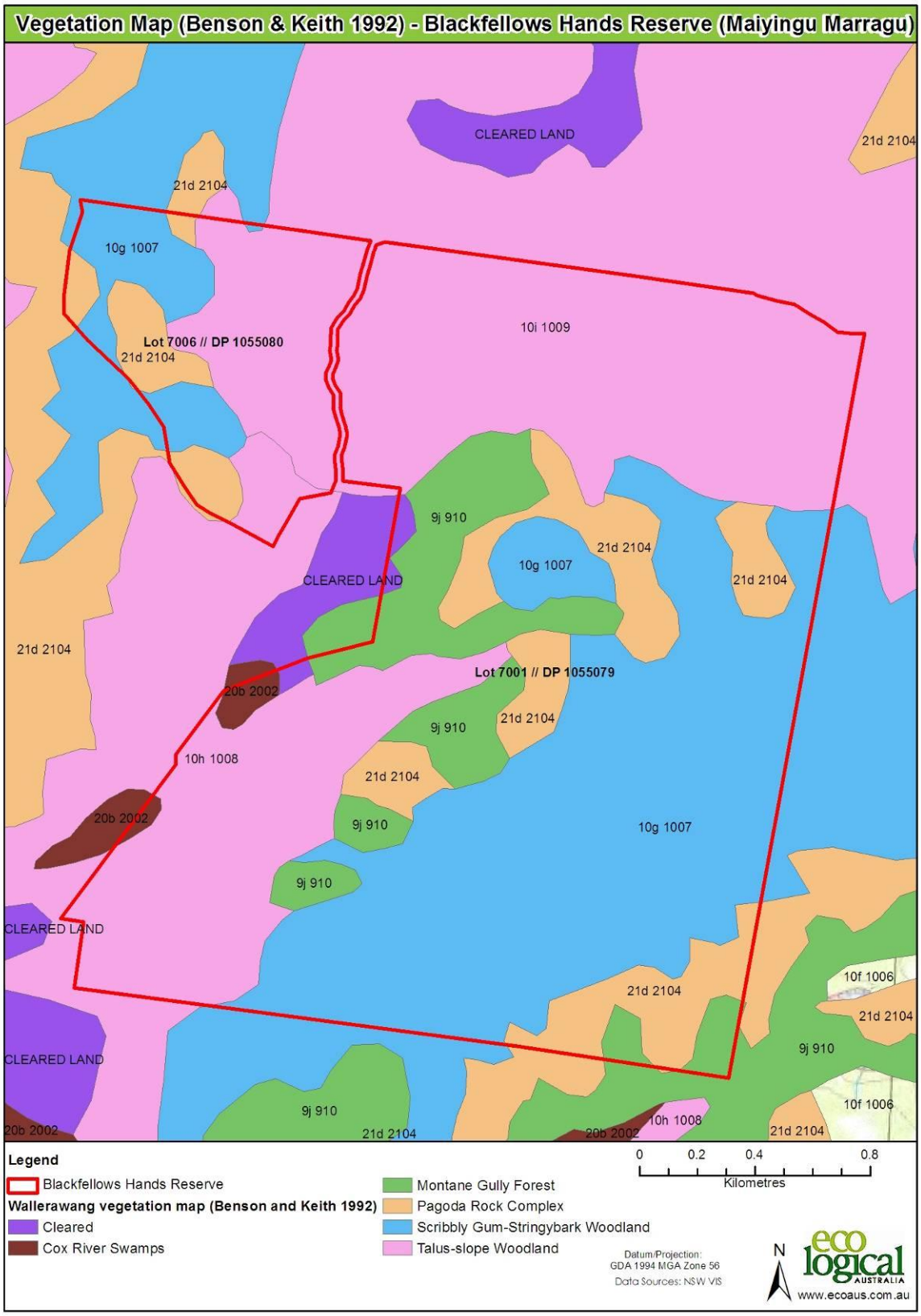

Figure 7: Royal Botanic Gardens vegetation map of the Blackfellows Hands Reserve (adapted from Benson and Keith 1992).

2.2.3 The Vegetation of the Western Blue Mountains

The vegetation of the western Blue Mountains area was prepared by the Department of Environment and Conservation in 2006 with funding from the Hawkesbury-Nepean Catchment Management Authority (HNCMA). The study described the native vegetation communities in the Capertee, Coxs, Jenolan and Gurnang Areas.

Nine separate communities were mapped within the boundaries of the Blackfellows Hand Reserve, though only eight are summarised here as Map Unit (MU) 44, 'Sandstone Plateaux Tea Tree – Dwarf She-oak – Banksia Rocky Heath', was not recorded during field survey. As discussed below, areas mapped as Map Unit 37 are more closely aligned to Map Unit 34, and have been remapped accordingly (**Figure 8**).

- **MU 3** – Hillslope Talus Mountain Gum – Brown Stringybark – Grey Gum Broadleaved Hickory Moist Forest
- **MU 8 –** Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest
- **MU 28 –** Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland
- **MU 29 –** Sandstone Slopes Sydney Peppermint Shrubby Forest
- **MU 30** – Exposed Blue Mountains Sydney Peppermint – Silvertop Ash Shrubby Woodland
- **MU 34 –** Tableland Slopes Brittle Gum – Broad-leaved Peppermint Grassy Forest (formerly mapped as, **MU 37** – Cox's Permian Red Stringybark – Brittle Gum Woodland
- **MU 35** – Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest
- **MU 43** – Pagoda Rock Sparse Shrubland

These communities are briefly described in the following sections. Text is summarised from DEC (2006).

Table 3: Area of Vegetation Types (DEC 2006) within the study site

Map Unit and Vegetation Type	Area (ha)
3 Hillslope Talus Mountain Gum - Brown Stringybark - Grey Gum - Broad-leaved Hickory Moist Forest	4
8 Newnes Sheltered Peppermint - Brown Barrel Shrubby Forest	7
21 Capertee - Wolgan Slopes Red Box - Grey Gum - Stringybark Grassy Open Forest	13
28 Sandstone Plateau And Ridge Scribbly Gum - Silver-top Ash Shrubby Woodland	17
29 Sandstone Slopes Sydney Peppermint Shrubby Forest	11
30 Exposed Blue Mountains Sydney Peppermint - Silver-top Ash Shrubby Woodland	35
35 Tableland Gully Mountain Gum - Broad-leaved Peppermint Grassy Forest	3
37 Coxs Permian Red Stringybark - Brittle Gum Woodland	18
43 Pagoda Rock Sparse Shrubland	31
44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath	20
62 Cleared and Severely Disturbed Lands	6
Grand Total	**165**

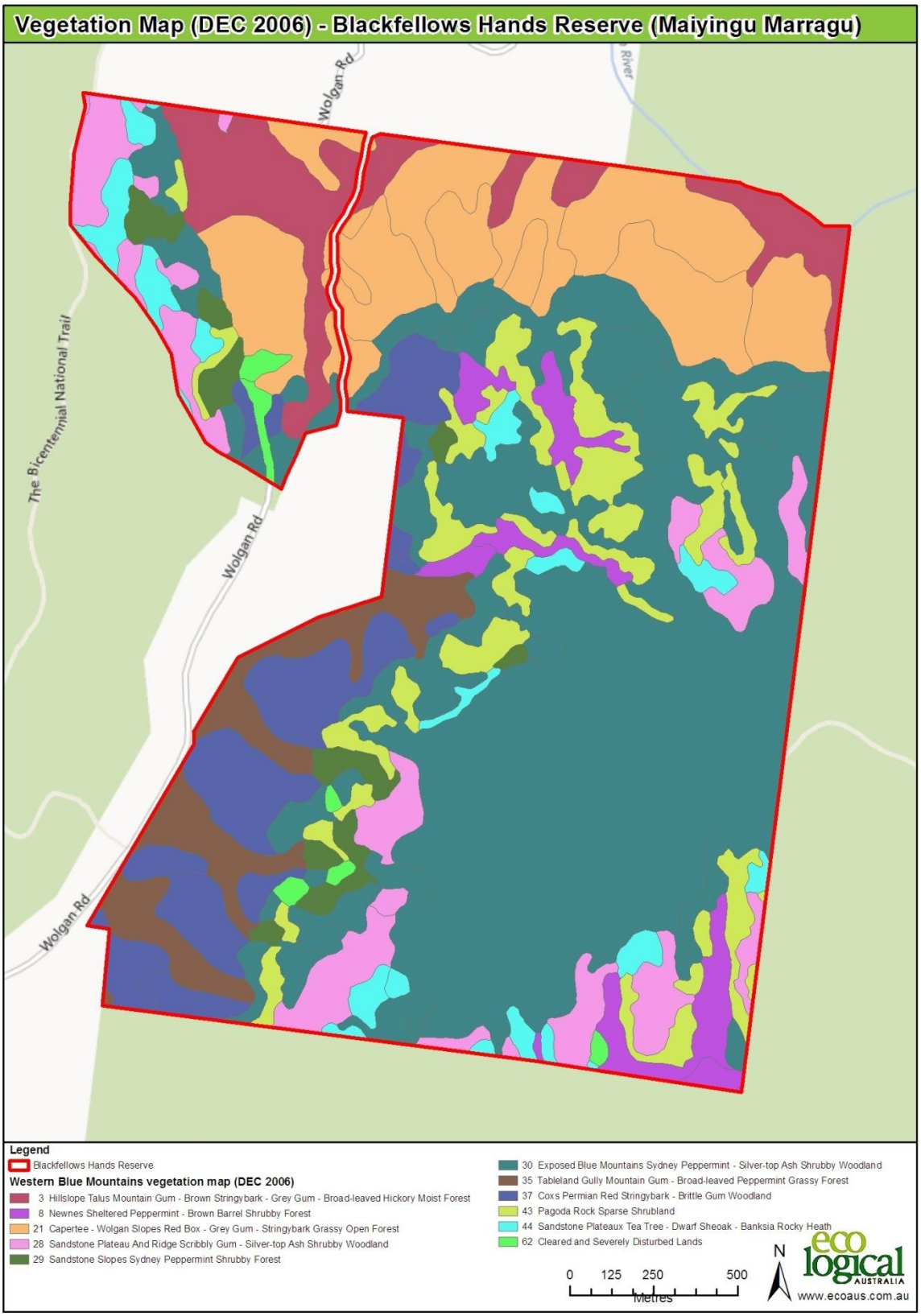

Figure 8: Vegetation of the study site, derived from DEC (2006)

MU 3 *– Hillslope Talus Mountain Gum – Brown Stringybark – Grey Gum Broadleaved Hickory Moist Forest*

Vegetation Type equivalent	This vegetation mapping unit is the equivalent of the Unit 9j (Benson and Keith 1992).
Area (ha)	4
Conservation status	Reservation status of this community appears to be poor, though due its landscape position clearing of this vegetation type is likely to be low.

A tall, moist forest often found along the steep Permian escarpment and ranges of the Wolgan and Capertee Valleys on sheltered slopes. It forms an open canopy of eucalypts – mainly *E*. *cypellocarpa* (Mountain Grey Gum), *E*. *punctata* (Grey Gum), *E*. *polyanthemos* (Red Box) and *E*. *blaxlandii* (Brown Stringybark) above a broken, uneven canopy of wattles. The groundcover is often discontinuous, with areas of graminoids and forbs separated by areas of fallen litter or rockfall. In all cases the sites are moderately diverse, with micro-topography inducing greater site variation.

The soils are usually lithosols or sandy loams derived from the weathering of talus sourced from the sandstone cliffs above (usually Triassic era Narrabeen sandstones of the Grose sub-group). There may be minimal influence from the Permian era shales that underlie both the sandstone outcrops and the talus slopes. The community extends from 260 to 1010masl, and receives between 650 – 910 mm of precipitation per annum.

***MU 8** – Newnes Sheltered Peppermint – Brown Barrel Shrubby Forest*

Vegetation Type equivalent	Open-forest: *Eucalyptus fastigata – Eucalyptus cypellocarpa – Eucalyptus dalrympleana* (Benson and Keith 1992)
Area (ha)	4
Conservation Status	Localised to the Newnes Plateau area. Clearing does not appear to have reduced its extent by much, though logging has occurred in most accessible stands. Predicted to be small areas of similar forests in the Wollemi National Park.

This is a tall forest community occupying steep protected slopes and gorges that dissect the outer edges of the Newnes Plateau. The main canopy species are *Eucalyptus piperita* (Sydney Peppermint), *Eucalyptus radiata* (Narrow-leaved Peppermint) and *Eucalyptus fastigata* (Brown Barrel). Other tree species that occur less frequently include *Eucalyptus oreades* (Blue Mountains Ash), *Eucalyptus cypellocarpa* (Mountain Grey Gum) and *Eucalyptus dalrympleana* subsp. *dalrympleana* (Mountain Gum).

A characteristic feature of this community is the moderately dense mid-stratum of shrubs and small trees that include *Leptospermum polygalifolium* (Lemon-scented Tea Tree), *Leucopogon lanceolatus* (Lance Beard-heath), *Monotoca scoparia* and *Polyscias sambucifolia* (Elderberry Panax).

Ground cover features a mix of graminoids such as *Lomandra longifolia* Spiny-headed Matrush) and *Dianella tasmanica* and a number of ferns such as *Pteridium esculentum* and *Sticherus flabellatus* var. *flabellatus.*

MU 28 – Sandstone Plateau and Ridge Scribbly Gum – Silvertop Ash Shrubby Woodland

Vegetation Type equivalent	This community is a component of (Benson and Keith's (1992) Unit 10g, Scribbly Gum – Stringybark Woodland, and is part of Tozer et al's (2006) Unit p136, Blue Mountains Ridgetop Community (Tozer et al 2006).
Area (ha)	17
Conservation Status	The community is well conserved throughout the Blue Mountains and Wollemi National Parks,

A community found on the shallow soils and rocky sites across the upper Blue Mountains sandstones. It is usually an open forest or woodland community that is characterised by a diverse mid-stratum that may be quite dense. The shrub layer is a diverse range of species from legumes (*Acacia* and *Bossiaea*) and epacrids (*Leucopogon* and *Monotoca* mainly) to Proteaceae (*Hakea*, *Persoonia* and *Lomatia*) and Myrtaceae (especially *Leptospermum*). *Boronia microphylla* is a common member of the community and with the other species a springtime flowering in this community is a spectacular sight. The canopy is dominated by *E*. *sieberi* (Silvertop Ash) and Scribbly Gum (*E*. *sclerophylla*), although other species are occasionally present. The groundcover is also quite diverse, and is dominated by legumes and graminoids, particularly sedges and flag iris (*Patersonia*).

The soils are usually shallow, with sandy loams and earthy sands dominating. The underlying substrates are almost invariably the Triassic era Narrabeen series, with sandstones being the main lithology. The elevation range is between 680 and 1140 masl, although the majority of the community is above 1000 masl. The precipitation is between 730 millimetres and 1050 millimetres *per annum*.

MU 29 – Sandstone Slopes Sydney Peppermint Shrubby Forest

Vegetation Type equivalent	This community is a component of (Benson and Keith's (1992) Unit 10g, Scribbly Gum – Stringybark Woodland, and is part of Tozer etal's (2006) Unit p136, Blue Mountains Ridgetop Community (Tozer et al 2006).
Area (ha)	11
Conservation Status	It is widespread throughout the Blue Mountains and Wollemi National Parks.

Semi-sheltered sandstone slopes and deeper soils on ridges on lower elevation of the Newnes Plateau carry a taller forest often solely dominated by *E. piperita* (Sydney Peppermint), but sometimes including *E. blaxlandii* (Brown Stringybark). It delineates the grade between the ridgetop woodlands and in the protected gully forests that gain more *E. radiata* (Narrow-leaved Peppermint) in the canopy. The mid-stratum is often dense, dominated by wattles, Proteaceae and epacrids, particularly *Leucopogon, Monotoca* and *Persoonia*. The groundcover layer is often relatively sparse, although the ground is well covered by litter and plant debris. The main species in the groundcover reflect the more sheltered position and include the *Amperea* (Native Broom), *Dianella* spp. (Flax-lilies), *Lomandra* spp. and *Pteridium* (Bracken Fern).

The unit is restricted to occurrences of Narrabeen sandstones, favouring ridges and upper slopes. Elevation range lies between 670 metres and 1160 metres above sea level with these receiving between 690 millimetres and 1070 millimetres of precipitation *per annum*.

MU 30 – Exposed Blue Mountains Sydney Peppermint – Silvertop Ash Shrubby Woodland

Vegetation Type equivalent	This community is a component of (Benson and Keith's (1992) Unit 10g, Scribbly Gum – Stringybark Woodland, and equates to the Blue Mountains Ridgetop Forest of Tozer *et al* (2006).
Area (ha)	35
Conservation Status	The community is extensively distributed to the north, south and east of the study area throughout the more elevated areas of the Blue Mountains and Wollemi reserves.

Occurs on broad sandstone ridges as a moderately tall forest (<20m in height) usually dominated by *Eucalyptus piperita* (Sydney Peppermint) and *Eucalyptus sieberi* (Silver-top Ash).

Tall shrubs such as *Leptospermum* spp. (Tea Trees) and *Hakea* spp. form a distinctive mid-stratum and many legumes, epacrids and proteaceous species are recorded in the community. Ground cover is sparse and often dominated by *Lomandra* spp. (Matrushes) and *Amperea xiphoclada* (Broom Spurge).

This unit is distributed from 700 to 1100 metres above sea level and typically receives between 700 and 1100 millimetres of precipitation per annum and grades into Map Unit 29 on the adjoining sheltered upper sandstone slopes

***MU35** – Tableland Gully Mountain Gum – Broad-leaved Peppermint Grassy Forest*

Vegetation Type equivalent	N/A
Area (ha)	3
Conservation Status	Reservation status of this community is low, improved by recent addition of Mount Walker (south of Wallerawang) to the reserve network.

Occurs in the deeper gullies and sheltered slopes and comprises a moderately tall open forest about 25m high. The main tree species are *Eucalyptus dalrympleana* (Mountain Gum), *Eucalyptus viminalis* (Ribbon Gum) and *Eucalyptus dives* (Broad-leaved Peppermint). *Eucalyptus pauciflora* (Snow Gum) is present near creeklines and *Eucalyptus macrorhyncha* (Red Stringybark) occurs in sheltered sites.

Shrubs are uncommon and the ground cover is dominated by grasses such as *Joycea pallida* and *Poa* spp. (Tussock Grasses) with a number of other species such as *Lomandra* spp. (Matrushes).

Prefers metamorphic associations on stony loam soils, with the favoured position lower in the landscape, typically where it is moderately well sheltered, between 780 and 1,100 masl.

***MU 37** – Cox's Permian Red Stringybark – Brittle Gum Woodland*

Vegetation Type equivalent	GW23 Tableland Hills Grassy Woodland (Tindall et al. 2004)
Area (ha)	18
Conservation Status	Not provided

This community occurs on the escarpment slopes and ridges and is a low woodland about 12m high. The main tree species are *Eucalyptus macrorhyncha* (Red Stringybark) and *Eucalyptus mannifera* (Brittle Gum) with localized occurrences of *Eucalyptus rossii (Tablelands Scribbly Gum), Eucalyptus rubida* (Candlebark) and *Eucalyptus dives* (Broad-leaved Peppermint).

Shrub growth is patchy with some areas devoid of shrub cover. *Lissanthe strigosa* (Native Cranberry) is the most common species. Ground cover is sparse and comprises forbs and occasional grasses.

This community has been mapped on the crests of lower slopes to the east of Wolgan Rd and the south of the Blackfellows Hands Track, though field data suggests that this community is actually more closely aligned to MU 34 - Tableland Slopes Brittle Gum – Broadleaved Peppermint Grassy Forest, as described above.

***MU 43** – Pagoda Rock Sparse Shrubland*

Vegetation Type equivalent	Loosely associated with Blue Mountains Heath (Tindall et al 2004)
Area (ha)	31
Conservation Status	Unique to the area, it is found extensively throughout Gardens of Stone and Western Wollemi National Park

This community occurs on the massive residual sandstone outcrops of the area that are known as 'pagodas' that are present on the edges of the sandstone plateaux and mesas.

The community is basically a heath with scattered emergent eucalypts and *Callitris rhomboidea* (Port Jackson Cypress Pine) and *Callitris endlicheri* (Black Cypress Pine).

Shrub species include *Calytrix tetragona* (Common Fringe-myrtle), *Leptospermum parvifolium* and *Leucopogon muticus*. Ground cover is relatively sparse and comprises a range of *Lomandra* spp. (Matrushes), low shrubs and herbs.

2.3 FLORA

124 species of native flora, and nine species exotic flora were recorded at the site. Species of significance that are not listed as threatened include,

For a full inventory of the flora recorded during survey, see **Appendix B.**

2.3.1 Threatened Flora Species

Records of six (6) threatened flora species are found within 10km of the study site, with two records of, *Derwentia blakelyi*, located within 600m site boundaries. Both records are on private land and were not able to be substantiated during the survey. This species was not recorded on site.

Of these six species, three potentially utilise the site, *Derwentia blakelyi*, *Eucalyptus cannonii* (Capertee Stringybark) and *Eucalyptus pulverulenta* (Silver-leaved Gum), though none were recorded during survey. Further details see **Appendix A**.

2.3.2 Noxious Weeds

The study area remained relatively free of introduced flora, though one noxious species listed under the *Noxious Weeds Act 1993* was recorded, *Rubus fruticosus* (Blackberry).

This is a Class 4 weed species, and it is a requirement under the Act for Lithgow City Council,

Table 4: Noxious weeds recorded during survey.

Common Name	Scientific Name	Class	Legal Requirement	Appropriate treatment	Locations
Blackberry	*Rubus fruticosus*	4	The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority	Cut and paint, Spring/Summer; Spray in late Spring	Figure 3, Points:

2.4 FAUNA

2.4.1 Fauna Habitats

The habitat elements available across the study site provide sheltering, foraging, and roosting habitat for a range of fauna groups, generally associated with sclerophyll forests and woodland. Exfoliating rock, rock outcrops and small caves are a distinct habitat feature present at the site.

Sclerophyll forests and woodland habitat

Sclerophyll forests and woodlands provide the following habitat features and the species that would utilise them are discussed further below.

- Intact canopy layer;
- Intact shrub-layer;
- Hollow-bearing trees;
- Dead Standing Trees (Stags);
- Leaf litter;
- Woody debris (fallen logs and braches);
- Termite mounds;
- Flowing and ephemeral drainage lines.

The intact canopy and shrub vegetation within the site provides a number of resources including nectar from flowering trees and shrubs which may be utilised by birds and arboreal mammals, whilst other species prey on the insects attracted by the flowers. Brush-tailed Possum (*Trichosurus vulpecula*) and Greater Glider (*Petauroides volans*) (**Plate 1**) were recorded during the nocturnal survey, These species would utilise insects, leaves, nectar and plant exudates within the canopy layer, and also provide prey for large carnivorous birds such as the Powerful Owl (*Ninox strenua*).

There are also a number of hollow bearing trees and stags, with hollows of various sizes, which provide potential shelter, roosting and breeding habitats for hollow-dependent fauna such as microchiropteran bats (microbats), arboreal mammals, and birds including forest owls and cockatoos.

Fallen logs, including some with hollows are not uncommon within the site, mainly as a result of natural decay. These logs provide shelter for ground-dwelling mammals and reptiles, which also use the leaf litter and woody debris present. Amphibians also use the dense leaf litter and ground-cover present.

The grassy understorey of the woodland communities provide a grazing substrate for large macropods such as Swamp Wallabies (*Wallabia bicolour*), Grey Kangaroos (*Macropus giganteus*) and the Red-necked Wallaby (*Wallabia rufogriseus*) , which were observed within the site during survey, while seeds of the grasses could be utilised by both birds and small mammals, such as the Bush Rat (*Rattus fuscipes*).

Additionally, the dense grassy layer is likely to provide habitat for a range of invertebrates which form food for larger predators. Larger carnivorous birds such as the Australian Raven (*Corvus coronoides*), Australian Magpie (*Gymnorhina tibicen*) and Black-faced Cuckoo-shrike (*Coracina novaehollandiae*) could prey upon small birds sheltering in trees and shrubs and lizards sheltering in the groundcover.

Plate 1: Greater Glider detected onsite

Exposed and exfoliating rock (sandstone), rocky outcrops and small caves

Rocky outcrops and caves are habitats often utilised by microbats. Nine species of microbat were recorded via ultra-sonic sound recording, including the cave dwelling species, Eastern Horse-shoe Bat (*Rhinolophus megaphyllus*), Eastern Bent-wing Bat (*Miniopterus schreibersii oceanensis*) and Large-footed Myotis (*Myotis adversus*) (a.k.a. the Fishing Bat).

For a full inventory of fauna recorded during survey, see **Appendix B**.

2.4.2 Threatened Fauna Species

Three threatened fauna species were detected during survey, Scarlet Robin (*Petroica boodang*) (**Plate 2**), Eastern Bent-wing Bat and Large-footed Myotis, with the Powerful Owl and Spotted-tailed Quoll recorded previously at the site.

The Spotted-tailed Quoll (*Dasyurus maculatus*) record was taken onsite in 1996, though this record is not considered reliable. If present in the area, this species may utilise the site as part of a broader home-range.

A further six species identified during the literature review are considered 'likely' or to have the 'potential' to utilise the site, these include microbat species, Large-eared Pied Bat (*Chalinolobus dwyeri*), Greater Broad-nosed Bat (*Scoteanax rueppellii*), the bird species, Glossy Black-Cockatoo (*Calyptorhynchus lathami*), Brown Tree-creeper (*Climacteris picumnus*), Diamond Firetail (*Stagonopleura guttata*), and the mammal species, Koala (*Phascolarctos cinereus*).

The full results of the Assessment of Likelihood for threatened fauna species are presented in **Appendix A**.

Plate 2: Scarlet Robin, a threatened species recorded onsite (listed as vulnerable under the TSC Act).

3 Management Issues

The main issues for management across the site were off-track usage by 4WD vehicles, trail and mountain bikes. There were very infrequent weed incursions, with only two sites flagged for immediate treatment where some *Rubus fruticosus* (Blackberry) has begun to take hold. Other management issues of concern included large wheel ruts causing erosion on marked tracks.

Management issues have been flagged on **Figure 4** using the prefix 'M'. See **Table 1** for further details.

3.1 DISTURBANCES

The entirety of the site supports a large area of relatively undisturbed vegetation. In general, the majority of the site has been subject to large scale natural disturbances in the past (e.g. bushfire events) with only minor ongoing disturbances evident. The following disturbances were observed during the field surveys.

3.1.1 Erosion and clearing on access tracks

The study site is bisected by Wolgan Rd, a sealed council road. There are two main unsealed tracks marked within the site boundaries, the Bicentennial National Trail on the western side of Wolgan Road, and the Blackfellows Hand Trail to the east. There is one main subsidiary of the Blackfellows Hands Trail also marked on the topographic map, leading to a lookout point at the most north-easterly outcrop of the site, above the Wolgan Valley.

Serious erosion issues have been recorded along these main tracks, as marked on **Figure 4**.

The Bicentennial Trail

Public access to this track is gained via an unmarked dirt track to the west of Wolgan Rd, directly opposite to the sign posted Blackfellows Hands Trail (**Figure 2**).. This trail extends south from Ben Bullen State Forest (SF), north through the study site (i.e. the AP area) back into the SF. This trail is used frequently by four wheel drive and trail bike vehicles, which has initiated severe erosion in a steeply graded area of the track leading into the study site. During and following high rainfall events, the substrate at this section of the track is continually displaced, and this erosion is exacerbated by continual use by off-road vehicles (**Plate 3**). As this track erosion is located within Ben Bullen SF, maintenance of this section of track is the responsibility of Forestry Corporation of NSW.

Minor erosional disturbance from four wheel drive and trail bike vehicles is evident on flatter sections of the track within the study area, where water has begun to pool in potholes. Sediments are mobilised when these pools are driven through at speed or during rain events when sediment runs off down slope.

Whilst this trail maintains some erosion issues as outlined above, there are relatively few exotic flora present along the track, and there were no 'off tracks' evident within the bounds of the study site.

Plate 3: Severe erosion on Bicentennial National Trail leading to the Blackfellows Hands Reserve, within the Ben Bullen State Forest.

The Blackfellows Hands Trail

Public access to this trail is gained via a sign-posted dirt track to the east of Wolgan Road (**Figure 2**). This track is also accessible from the far east of the site, from the Newnes State Forest. Again, this trail is used frequently by four wheel drive and trail bike vehicles, which has initiated both minor and major erosional issues along the track. Use of this track by private vehicles has initiated 'off tracks' in various locations, with these off tracks used to varying degrees. The location of the off tracks have been flagged using handheld GPS, with a waypoint marking the entry and the trails followed to identify the entirety of the route (**Table 1**, **Figure 4**).

One substantial off track which has been created, has led to the establishment of two significant additional off tracks (M15 and M16, **Figure 4**). Substantial resources have been employed to establish these track extensions, with tree felling and earth works evident at the site. Given the resources required to construct tracks to this degree, it is considered likely the construction was established by the Rural Fire Service, though this could not be confirmed at the time of writing. Lithgow City Council was not aware of these tracks, nor were the Mingaan Aboriginal Corporation (**Plates 3**, **4** and **5**).

Plate 4: Two unmarked significant offtracks within the study site.

Plate 5: Significant earthworks and recent clearing can be seen on the left hand fork of the offtrack.

Plate 6: Significant earthworks and clearing is evident along the right hand fork.

Use of this track by 4WD vehicles and trailbikes has led to the formation of large ruts in many parts of the trail, and the establishment of trailbike tracks into the bushland (**Plate 7**, **Plate 8**). Tree damage along tracks is also evident from 4WD vehicles ().

Plate 7: Major wheel ruts from inappropriate use of 4WD vehicles on Blackfellows Hands Trail during wet periods

Plate 8: Water pooling in wheel ruts that have been formed by 4WD use of the study site

Plate 9: Wheel ruts and erosion caused by inappropriate use of trailbikes in the study site

Plate 10: Tree damage from 4WD vehicles

Plate 11: Tree damage caused by indiscriminate hacking of tree bark within the study site

3.1.2 Rubbish dumping

There was not extensive rubbish dumping recorded within the study site, though some asbestos dumping was identified at the site (AB1, **Figure 4**; **Plate 12**). Other minor rubbish dumping was recorded at M19, **Figure 4**; **Plate 13**).

Plate 12: Asbestos dumped at the study site, location AB1.

Plate 13: Minor rubbish dumping found at the study site, location M19 and M6.

3.1.3 Unsolicited/unauthorised land uses

An unauthorised camp site has become established at the north-eastern boundary of the study site, looking into Wolgan Valley (M7) (**Plate 14**). This camp site has led to the collection of fallen timber from the surrounding bush, minor rubbish dumping (e.g. beer bottles/cans) and the surrounding bush being used as a crude toilet facility.

Plate 14: Unauthorised camping area in the study site

3.1.4 Erosion

Along with the erosion issues identified along Blackfellows Hands and the Bicentennial Trails, topsoil erosion is occurring on walk tracks, such as the track to the Blackfellows Hands cave (**Plate 15**).

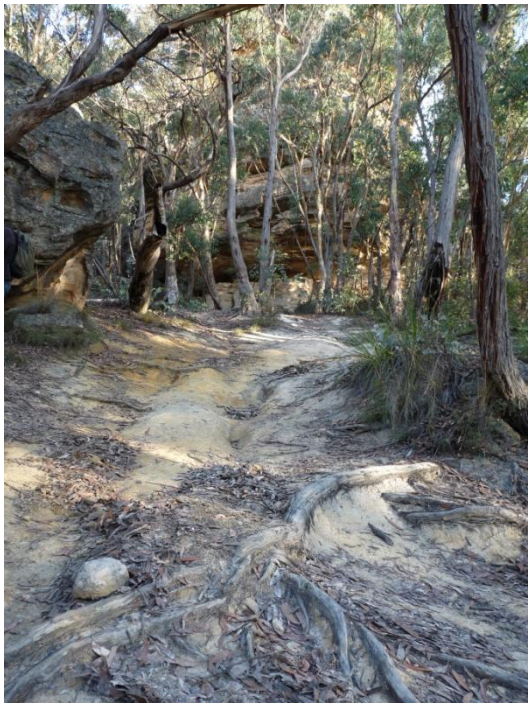

Plate 15: Track erosion on the walking path to the Blackfellows Hands cave

3.1.5 Weed invasion

Isolated patches of weed invasion occur within the study site, particularly along tracks, however some areas of weeds cannot be linked directly to any previous disturbance. The most significant weed areas recorded were in the canyon area, where two outbreaks of *Rubus fruticosus* (Blackberry), where recorded (M13, M17 and M18, **Figure 4**; **Plate 16** and **Plate 17**). Isolated records of Dandelion where made in intact bush area, not generally accessed by the public, though given their isolation and limited extant these records where not marked onto management maps of the site. Some Blackberry was also recorded off drainage lines along the Wolgan Rd, at the northern end of the site approaching the Wolgan Valley (**Plate 18**).

Plate 16: Blackberry incursion located at M13 in the canyon of Blackfellows Hands Trail.

Plate 17: Blackberry incursion located at M18 in the canyon of Blackfellows Hands Trail.

Plate 18: Blackberry incursions off drainage along the Wolgan Rd.

3.1.6 Exotic fauna

Evidence of European Red Fox (*Vulpes vulpes*) and European Rabbit were observed during survey.

4 Cultural Values

The following has been provided by John Lennis of Migaan AC.

The Blackfellows Hand Aboriginal Place has Aboriginal rock shelters with painted art, a teaching site and occupation site.

Blackfellows Hand Aboriginal Place was an important meeting and educational place and holds special meaning for Wiradjuri people. The place is also highly valued by the wider Aboriginal community, including Gandangara, Dharug and Dharkinjung people. The area is regarded for its richness in wild resources and its natural beauty - the vegetation, rock formations, ochres and waterfalls create an aesthetic ambience. Blackfellows Hand Aboriginal Place was also important as an occupation site and includes a men's and a women's area. There is a women's birthing area in a secluded part of the complex.

Blackfellows Hand holds special meaning to Wiradjuri people because of their continuing cultural connection to the place. The site complex includes culturally significant rock shelters and stencil-art which provide a physical and spiritual link to ancestors and provide a place where traditional culture can be sustained. The area is used by the Aboriginal community as a ‘bush school room' where young people can hear stories from Elders and learn to collect and use bush food and natural medicine.

5 Threat Assessment

Existing and potential threats to the conservation values of the study site have been assessed and include introduced weed and pest species; unauthorised activities and access including rubbish dumping, firewood collection, physical damage; inappropriate fire regimes and climate change. These threats are discussed in subsequent sections.

5.1 THREATS

The terrain of the study site has rendered it largely immune to historic disturbance, however there are also ongoing disturbances primarily associated with off road vehicles (4WD and trail bikes) use or access. The nature of these disturbances and the threat they pose to the conservation values of the study site are discussed below.

5.1.1 Exotic Flora and Fauna

Generally, the study site is largely free of weeds. In areas that are more accessible, the study site currently supports only very minor weed infestations which could be relatively easily controlled.

The two areas that require most attention are:

Blackfellows Hands Trail

There are some relatively small infestations of Blackberry along the drainage line through the canyon area of this track. This species is listed as a Class 4 noxious weed (*Noxious Weed Act 1993*) and requires the landholder to control '*the growth and spread of the plant ... according to the measures specified in a management plan published by the local control authority*'. The quicker these incursions are addressed the less risk they have of spreading locally within the canyon or propagating elsewhere on the site via fauna seed dispersal avenues.

Drainage lines across Wolgan Rd

The drainage lines leading down the escarpment from the west of the site to the east currently also have small incursions of Blackberry, that are at risk of expanding through the catchment if not controlled in the near future. They are easily located along the roadside during the decent into the Wolgan Valley. Drainage lines are obviously a strong vector for weed dispersal, not limited to Blackberry, and as such it is recommended that silt fences be installed at these runoff points so that the water is not a vector for weed propagules being introduced further into the site.

5.1.2 Unauthorised Activities / Access

Rubbish dumping

Illegal rubbish dumping is likely to continue to pose an ongoing threat to the habitats within the study site, particularly along the Blackfellows Hands Trail, as it is obviously a popular recreational venue with off road vehicles. Whilst this site remains signposted from the Wolgan Rd, it will continue to attract such land uses and highlight access for illegal dumping. Such dumping physically damages vegetation and habitats and is a vector for weed invasion.

Illegal dumping can be addressed and potentially minimised through engendering greater understanding of the threats posed by such activities. In addition, more direct actions such as restricting vehicular access off track and undertaking regular monitoring are important strategies for mitigating the threats from illegal dumping.

Physical damage from vehicular traffic

Off road vehicle recreational activities are likely to continue to pose an ongoing threat to the habitats within the study site, particularly along the Blackfellows Hands Trail, due to a more moderate incline than the Bicentennial National Trail. Of particular concern is the trampling and other physical damage that may occur from recreational vehicle use or through vandalism.

These activities also have the potential to adversely affect the cultural values of the study site. The threat from physical damage to vegetation and habitats within the study site may be addressed both through strategic placement of fencing and bollards to limit access, the introduction of boundary fencing, and through engendering greater understanding of the threats posed by such activities. Maintaining the existing trail may avoid some damage to vegetation adjacent to the trail, which is caused when vehicles must use the edges of the trail to avoid obstacles (such as ruts and standing water).

Vandalism

Vandalism in the form of graffiti or desecration of cultural sites was not recorded during the survey, though this remains a potential threat to the cultural and ecological diversity of the site.

Of particular concern is the Blackfellows Hands Cave, which is marked on topographic maps, is easily accessible and has no restriction on number of visitors or proximity of contact with these significant Indigenous artworks. The introduction of engineered protective structures in proximity to the artworks are likely to detract from the setting and cultural significance of the site, though passive discouragement through placement of boulders, logs and signage sympathetic to the setting may provide sufficient discouragement to allow for a greater level of protection for this site. The artworks in this cave are also under threat from appears to be a leaching of oily substances from the rock surface, Further research is required prior to determination of the origin of the substance. possibly a response to the change in water table due to underground mining of the site. Consultation with Centennial Coal is suggested to discuss potential remediation of this threat to the artworks.

Other caves at the site have been subject to damage from fires, which stains cave ceilings and potentially impacts upon culturally significant sites, as well as flora and fauna in these area. This should again be discouraged through placement of boulders, logs and signage sympathetic to the setting to provide a greater level of protection.

5.1.3 Climate Change

Climate Change may significantly affect biodiversity and cultural values by changing population size and distribution of species, modifying species composition, altering the geographical extent of habitats and ecosystems, changing the hydrological regime and increasing the incidences of storm events. The potential impact of climate change is difficult to assess since it depends on the compounding effects of other pressures.

'Human-caused Climate Change' is listed as a key threatening process under the TSC Act and 'Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases' is also listed as a key threatening process under the EPBC Act. Climate Change is likely to play a role in the long-

term biodiversity value of the study site.

6 Management Strategies and Actions

This plan focuses on the management of vegetation and associated habitats and cultural values within the study site over the next 5 years. A detailed table of proposed actions, desired outcomes and a priority rating of each action is given in **Table 5**. The proposed actions are informed by the results of the assessment and best practice management.

A description of the priority ratings detailed in **Table 5** is given below.

High	Priority actions to be commenced in the near future to achieve the objectives and desired outcomes
Moderate	Priority actions that are not urgent but necessary to achieve the objectives and desired outcomes
Low	Priority actions of which the timing is discretionary based on available resources at the time but are desirable to achieve the objectives and desired outcomes

Note: some works undertaken on site may require licensing by the Office of Environment and Heritage (OEH), due to the type of vegetation present (e.g. threatened ecological communities) and/or threatened species habitat). Currently none of the vegetation identified within the study site is listed as threatened, and no threatened flora have been recorded. Should actions be proposed that may impact on threatened microbats such as removal of hollow bearing trees or impacts to caves and rocky crevices that may provide roosting/nesting habitat these species, requirements for a Section 91 licence under the TSC Act should be discussed with OEH.

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Table 5. Management Strategies, Actions and Priorities

VALUE/THREAT	DESIRED OUTCOMES	MANAGEMENT STRATEGIES/ACTIONS	PRIORITY
Flora and Fauna	Native flora and fauna species and communities are preserved Habitat values are restored in areas subject to past disturbance Maintain or improve existing threatened species habitats/populations	Protect native plants and animals from impacts of introduced species, fire and unauthorised access through the use of management actions	High
		Treat incursions of the noxious weed Blackberry (*Rubus fruticosus*) before it expands further across the site	High
		Construct and maintain fences around the sites to reduce incidence of rubbish dumping and firewood collection	Moderate
		Manage native vegetation and habitat within the study site by removing weeds and regenerating the sites	Moderate
		Protect and recover Endangered Ecological Communities (EECs) through appropriate bush regeneration actions	Moderate
		Explore the potential for rehabilitation of disturbed areas of native vegetation in consultation with the HNCMA, qualified botanists and experts. Discussions should include rehabilitation methods and licensing requirements to undertake work in EECs or threatened species habitat.	Moderate
		Liaise with neighbours to encourage the retention and appropriate management of key habitat and ecological corridors adjacent to the sites	Low
Unauthorised activities/access (rubbish dumping, firewood collection, camping and physical damage)	Unauthorised uses are prohibited and managed Discourage unauthorised vehicle access The local community is aware of the significance of the sites Visitor use is appropriate and ecologically sustainable Appropriate management actions are	Maintain existing fencelines and address any areas where unauthorized access is adversely impacting on the study site	Moderate
		Implement erosion and sedimentation control measures for existing tracks impacted by vehicle use	Moderate
		Implement signage at sites prone to rubbish dumping or with significant cultural and/or ecological values	High
		Monitor rubbish dumping and remove as soon as possible to minimise future rubbish dumping	High

VALUE/THREAT	DESIRED OUTCOMES	MANAGEMENT STRATEGIES/ACTIONS	PRIORITY
	implemented to ensure damage caused by unauthorised visitors is reduced Illegal rubbish dumping and firewood collection is reduced and where possible eliminated	Erect remote supervision signage -	- High
Introduced species	Introduced plants and animals are controlled and where possible eliminated Pest control programs are undertaken in consultation with neighbouring landholders Regular weed control measures are undertaken	Undertake ongoing control programs for noxious weeds identified in section 2.3.3 in collaboration with OEH and Lithgow City Council weed control activities adjacent to the study site. Works should be undertaken by and/or supervised by appropriately qualified persons at all times. Weed material is to be composted on-site or removed to an authorised Waste Disposal Centre	 High
		Monitor noxious and significant environmental weeds and control any new outbreaks where possible utilising low impact bush regeneration methods	High
		Manage introduced species in collaboration with Lithgow City Council and OEH to maximise landscape outcomes and reduce costs	Moderate
		Herbicides to be used in weed management activities within the study site will be applied in accordance with their registered product label, the *Pesticides Act 1999*, *Occupational Health and Safety Act 2000* and associated regulations	Moderate
		Investigate various options of utilising the local community and/or 'land alive' trainees for introduced species control and management	Moderate
		Undertake integrated pest control programs with relevant government agencies, organisations and neighbours to maximise benefits and reduce costs	Low
		Implement the Fox Threat Abatement Plan as it relates to the study site to reduce native animal predation in conjunction with neighbouring landholders, i.e. State Forests and National Parks and Wildlife (a part of the OEH)	Low

VALUE/THREAT	DESIRED OUTCOMES	MANAGEMENT STRATEGIES/ACTIONS	PRIORITY
Research / monitoring / education	Research enhances the knowledge and management of the study site Education and monitoring has minimal environmental impact	Establish an education and training program for key persons involved in management actions within the study site. The program should seek to raise awareness of the conservation and cultural values of the study site and appropriate management actions and safeguards	High
		Undertake regular inspections to monitor the status of key ecological values, identify new weed incursions and other threats to the study site and to assess the efficiency of management strategies and actions.	Low
		Monitor the success of the management actions at appropriate intervals, and prepare modifications where necessary.	Low
		Educate residents surrounding the study site with respect to the values of the study site and those actions and activities which are and are not appropriate within the study site i.e. firewood collection, rubbish dumping, etc	High
Management operations	Management facilities and operations adequately serve management needs and have minimal impact	Gate, block and/or signpost trails as required to restrict the creation of unauthorised off-tracks	High
		Maintain all roads and management trails within the sites in conjunction with the Rural Fire Service, Council and Forest NSW.	Moderate
		Implement actions described within this table	Moderate

6.1 MONITORING AND PLAN REVIEW

Monitoring the implementation of the Plan over time is an important task for assessing the success of the actions proposed and should be undertaken by appropriately skilled persons.

The objectives of the monitoring program are;

- to record changes to the vegetation and habitats within the study site as a result of vegetation management activities, and thus assess the success of the recommended actions; and
- to assess the need to adapt the management actions to respond to new threats, i.e., new incursions of invasive weeds, and to improve the recovery and/or management of the vegetation and habitats within the study site.

Initial monitoring of the sites should include regular random meander surveys to be undertaken at least annually with the objective of assessing more widely the effectiveness of the recommended management activities and to assess other threats such as new invasive weed incursions and ongoing use of campsites and off-tracks. The results of the monitoring activities should be summarised in a brief annual report.

6.2 REPORTING AND EVALUATION

A brief concise report documenting the progress towards achieving the objectives of the Plan should be prepared on an annual basis. The report should comment on:

- Works undertaken, weed management activities, fire management activities and monitoring activities;
- Effort including person hours, resources, and other costs associated with each action;
- Progress of natural regeneration through natural recruitment;
- The efforts expended to increase awareness / education / community involvement in the management of the study site; and
- Any proposed modifications to the management actions identified in the Plan.

The strategies identified in the Plan may require modification as the plan implementation proceeds. Where significant modification of strategies are proposed, Lithgow City Council should discuss the alternative strategies with Mingaan AC and document annually in monitoring reports.

Ongoing management and maintenance of the sites after the planning period will be necessary to achieve the objectives of the Plan. These activities must include follow-up weed management, assessments for new weed incursions, fire management, and other requirements that may be necessary for achieving the Plan objectives.

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Appendix A: Threatened Species Likelihood

Flora species

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Myrtaceae	*Eucalyptus cannonii*	Capertee Stringybark	V	V	Eucalyptus cannonii is restricted to an area of about 100 by 60 km in the central tablelands of NSW. The western border is approximately marked by a line between Bathurst and Mudgee, while the eastern locations occur approximately on a line between Lithgow and the town of Bylong. Within this area the species is often locally frequent. The altitude range of Eucalyptus cannonii is from about 460 m to 1040 m. Within the range, the species appears to tolerate most situations except the valley floors. Recorded from Tablelands Grassy Woodland Complex communities and Talus Slope Woodland, and in Winburndale Nature Reserve within woodland dominated by Red Stringybark (Eucalyptus macrorhyncha) and Long-leaved Box (Eucalyptus goniocalyx) (DECC 05).	Potential - not recorded during survey

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Myrtaceae	*Eucalyptus pulverulenta*	Silver-leaved Gum	V	V	The Silver-leafed Gum is found in two quite separate areas, the Lithgow to Bathurst area and the Monaro (Bredbo and Bombala areas). Grows in shallow soils as an understorey plant in open forest, typically dominated by Brittle Gum (Eucalyptus mannifera), Red Stringybark (E. macrorhynca), Broad-leafed Peppermint (E. dives), Silvertop Ash (E. sieberi) and Apple Box (E. bridgesiana) (DECC 05).	Potential - not recorded during survey
Proteaceae	*Persoonia hindii*		E	-	Restricted to the Newnes Plateau in the Blue Mountains, north of Lithgow. Was only discovered in 1989 and all known locations occur within Newnes State Forest. Occurs in dry sclerophyll forests and woodlands on sandy soils. Stoloniferous (has underground horizontal stems) and is thought to be clonal. Hence, each location may comprise only one to a few individuals. Flowers January to March, possibly with sporadic flowering in other months (DECC 05).	No

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Proteaceae	*Persoonia marginata*	Clandulla Geebung	V	V	Known from only four disjunct locations on the Central Tablelands and Central Coast. Core of the species distribution is within Clandulla State Forest, west of Kandons. Disjunct populations occur; to the north at Dingo Creek and Mount Dangar within the Wollemi and Goulburn River National Parks; to the south within Ben Bullen State Forest, south-east of Capertee; and to the south-east at Devils Hole, north of Colo Heights within Parr State Recreation Area. Grows in dry sclerophyll forest and woodland communities on sandstone. Has a persistent soil stored seed bank and appears to respond well to disturbance, with greater densities found along the edges of tracks and in areas disturbed by forestry activities (DECC 05).	No

Family	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Rutaceae	*Asterolasia elegans*	Asterolasia elegans	E	E	Occurs north of Sydney, in the Baulkham Hills, Hawkesbury and Hornsby local government areas. Also likely to occur in the western part of Gosford local government area. Known from only seven populations, only one of which is wholly within a conservation reserve. Occurs on Hawkesbury sandstone. Found in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest. The canopy at known sites includes Turpentine (Syncarpia glomulifera subsp. glomulifera), Smooth-barked Apple (Angophora costata), Sydney Peppermint (Eucalyptus piperita), Forest Oak (Allocasuarina torulosa) and Christmas Bush (Ceratopetalum gummiferum) (DECC 05).	No
Scrophulariaceae	*Derwentia blakelyi*	Derwentia blakelyi	V	-	Restricted to the western Blue Mountains, near Clarence, near Mt Horrible, on Nullo Mountain and in the Coricudgy Range. Occurs at fewer than 20 locations, none of which is in a conservation reserve. Occurs in eucalypt forest, often in moist areas. Known locations all have small population sizes (DECC 05).	Potential - not recorded during survey

Fauna species

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Mammalia (Chiroptera)	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Hirundo ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves. They remain loyal to the same cave over many years. Likely to hibernate through the coolest months. It is uncertain whether mating occurs early in winter or in spring (DECC 05).	Likely - not recorded during survey
Mammalia (Chiroptera)	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V		The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings (DECC 05).	No
Mammalia (Chiroptera)	*Miniopterus schreibersii oceanensis*	Eastern Bentwing-bat	V		Eastern Bent-wing Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. Breeding or roosting colonies can number from 100 to 150,000 individuals. At other times of the year, populations disperse within about 300 km range of maternity caves (DECC 05).	Yes - recorded during survey

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Mammalia (Chiroptera)	*Mormopterus norfolkensis*	Eastern Freetail-bat	V		The Eastern Freetail-bat is found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost maily in tree hollows but will also roost under bark or in man-made structures (DECC 05).	Unlikely
Mammalia (Chiroptera)	Myotis macropus	Southern Myotis, Large-footed Myotis	—	V	Will occupy most habitat types such as mangroves, paperbark swamps, riverine monsoon forest, rainforest, wet and dry sclerophyll forest, open woodland and River Red Gum woodland, as long as they are close to water (Churchill 1998). While roosting is most commonly associated with caves, this species has been observed to roost in tree hollows, amongst vegetation, in clumps of Pandanus, under bridges, in mines, tunnels and stormwater drains (Churchill 1998). However the species apparently has specific roost requirements, and only a small percentage of available caves, mines, tunnels and culverts are used (Richards 1998).	Yes - recorded during survey
Mammalia (Chiroptera)	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V		The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows (DECC 05).	Unlikely

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Mammalia (Chiroptera)	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V		The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest (DECC 05).	Potential - not recorded during survey
Aves	Calyptorhynchus lathami	Glossy Black-Cockatoo	V	E	The species is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (Allocasuarina littoralis), Forest She-oak (A. torulosa) or Drooping She-oak (A. verticillata) occur. In the Riverina area, again usually associated with woodlands containg Drooping She-oak (primary food source) but also recorded in open woodlands dominated by Belah (Casuarina cristata) (DECC 05).	Potential - no evidence recorded during survey
Aves	Climacteris picumnus	Brown Treecreeper	V		The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. The western boundary of the range of Climacteris picumnus victoriae runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell. The eastern subspecies lives in eastern NSW in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands such as the Snowy River Valley, Cumberland Plains, Hunter Valley and parts of the Richmond and Clarence Valleys. The population density of this subspecies has been greatly reduced over much of its range. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes	Potential - not recorded during survey

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
					and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; fallen timber is an important habitat component for foraging; also recorded less commonly in similar woodland habitats on the coastal ranges and plains.	
Aves	Lophoictinia isura	Square-tailed Kite	V		The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast, arriving in September and leaving by March. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland (DECC 05).	Unlikely
Aves	Melanodryas cucullata	Hooded Robin	V		The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Territories range from around 10 ha during the breeding season, to 30 ha in the non-breeding season. May breed any time between July and November, often rearing	Unlikely

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
					several broods (DECC 05).	
Aves	Ninox strenua	Powerful Owl	V		The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the coastal side of the Great Dividing Range from Mackay to south-western Victoria. In NSW, it is widely distributed throughout the eastern forests from the coast inland to tablelands, with scattered, mostly historical records on the western slopes and plains. Now uncommon throughout its range where it occurs at low densities. The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. Powerful Owls are monogamous and mate for life. Nesting occurs from late autumn to mid-winter, but is slightly earlier in north-eastern NSW (late summer - mid autumn) (DECC 05).	Yes - previously recorded at the site
Aves	Oxyura australis	Blue-billed Duck	V		The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. It is generally only during summer or in drier years that they are seen in coastal areas. The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. Blue-billed Ducks are partly migratory, with short-distance movements between breeding swamps and overwintering lakes with some long-distance dispersal to breed during spring and early summer. Blue-billed Ducks usually nest solitarily in Cumbungi over deep water between September and February (DECC 05).	No

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Aves	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subsp.)	V		The Grey-crowned Babbler has two distinctive subspecies that intergrade to the south of the Gulf of Carpentaria. West of here the subspecies rubeculus, formerly considered a separate species (Red-breasted Babbler) is still widespread and common. The eastern subspecies (temporalis occurs from Cape York south through Queensland, NSW and Victoria and formerly to the south east of South Australia. This subspecies also occurs in the Trans-Fly Region in southern New Guinea. In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. It also occurs in woodlands in the Hunter Valley and in several locations on the north coast of NSW. It may be extinct in the southern, central and New England tablelands. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Territories range from one to fifty hectares (usually around ten hectares) and are defended all year (DECC 05).	No
Aves	Pyrrholaemus sagittatus	Speckled Warbler	V		The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive. The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Large, relatively undisturbed remnants are required for the species to persist in an area (DECC 05).	Potential

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Aves	*Petroica boodang*	Scarlet Robin	V	—	The Scarlet Robin is found in south-eastern and south-western Australia, as well as on Norfolk Island. In Australia, it is found south of latitude 25°S, from south-eastern Queensland along the coast of New South Wales (and inland to western slopes of Great Dividing Range) to Victoria and Tasmania, and west to Eyre Peninsula, South Australia; it is also found in south-west Western Australia. The Scarlet Robin lives in open forests and woodlands in Australia, while it prefers rainforest habitats on Norfolk Island. During winter, it will visit more open habitats such as grasslands and will be seen in farmland and urban parks and gardens at this time (BIB, 2006).	Yes - recorded during survey
Aves	*Stagonopleura guttata*	Diamond Firetail	V		The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Cental and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW, though is very rare west of the Darling River. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities (DECC 05).	Potential - not recorded during survey

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Aves	*Xanthomyza phrygia* (found under Anthochaera phrygia)	Regent Honeyeater	CE	E	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Once recorded between Adelaide and the central coast of Queensland, its range has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Their habitat woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes, which support a rich range of species. There are three known key breeding areas, two of them in NSW - Capertee Valley and Bundarra-Barraba regions. The species breeds between July and January (DECC 05).	No
Amphibia	*Litoria booroolongensis*	Booroolong Frog	E1		The Booroolong Frog is restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. It has disappeared from much of the Northern Tablelands, however several populations have recently been recorded in the Namoi catchment. The species is rare throughout most of the remainder of its range. They live along permanent streams with some fringing vegetation cover such as ferns, sedges or grasses and adults occur on or near cobble banks and other rock structures within stream margins (DECC 05).	No

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Amphibia	*Pseudophryne australis*	Red-crowned Toadlet	V		The Red-crowned Toadlet has a restricted distribution. It is confined to the Sydney Basin, from Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains. Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Red-crowned Toadlets are quite a localised species that appear to be largely restricted to the immediate vicinity of suitable breeding habitat. Red-crowned Toadlets are usually found as small colonies scattered along ridges coinciding with the positions of suitable refuges near breeding sites. Due to this tendency for discrete populations to concentrate at particular sites, a relatively small localised disturbance may have a significant impact on a local population if it occurs on a favoured breeding or refuge site (DECC 05).	No
Insecta	*Paralucia spinifera*	The Bathurst Copper Butterfly	E1	V	Occurs on the Central Tablelands of NSW in an area approximately bounded by Oberon, Hartley and Bathurst. The butterfly is found at 35 locations, all within the Greater Lithgow, Bathurst Regional and Oberon local government areas. Occurs above 850 m elevation, at sites with a south-west to north-west aspect, usually where direct sunlight reaches the habitat, and with extremes of cold such as regular winter snowfalls or heavy frosts. Geology, soils and dominant vegetation canopy species vary between habitat locations. However vegetation structure is consistent, commonly open woodland or open forest with a sparse understorey that is dominated by the shrub, Blackthorn Bursaria spinosa subsp. lasiophylla. Its lifecycle relies on a mutualistic relationship with the ant, Anonychomyra itinerans, and on the presence of B. spinosa subsp. lasiophylla which is used as the larval food plant. The butterflies emerge between August (later at higher altitude sites) and November, with a two-week peak of activity in September (DECC 05).	No

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Mammalia	*Dasyurus maculatus*	Spotted-tailed Quoll	V		The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Queensland. Only in Tasmania is it still considered common. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline (DECC 05)	Yes - previously recorded at the site
Mammalia	*Petrogale penicillata*	Brush-tailed Rock-wallaby	E1	V	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. However the distribution of the species across its original range has declined significantly in the west and south and has become more fragmented. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Highly territorial and have strong site fidelity with an average home range size of about 15 ha (DECC 05).	Potential - no evidence recorded survey
Mammalia	*Phascolarctos cinereus*	Koala	V		The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. It was briefly historically abundant in the 1890s in the Bega District on the south coast of NSW, although not elsewhere, but it now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands. Inhabit eucalypt woodlands and forests (DECC 05).	Potential - no evidence recorded survey

Class	Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
Mammalia	*Aepyprymnus rufescens*	Rufous Bettong	V		The original range from Coen in north Queensland to central Victoria has been reduced to a patchy distribution from Cooktown, Queensland, to north-eastern NSW as far south as Mt Royal National Park. In NSW it has largely vanished from inland areas but there are sporadic, unconfirmed records from the Pilliga and Torrington districts. Rufous Bettongs inhabit a variety of forests from tall, moist eucalypt forest to open woodland, with a tussock grass understorey. A dense cover of tall native grasses is the preferred shelter, and they are nocturnal (DECC 05).	No
Mammalia	*Petaurus norfolcensis*	Squirrel Glider	V		The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Require abundant tree hollows for refuge and nest sites (DECC 05).	No
Reptilia	*Eulamprus leuraensis*	Blue Mountains Water skink	E1	E	Restricted to the middle and upper Blue Mountains west of Sydney, the Blue Mountains Water Skink is known from less than 40 locations extending from Newnes Plateau in the north-west to just south of Hazelbrook in the south-east. The Blue Mountains Water Skink occurs at high elevations between 560 m and 1060 m. Recent genetic research indicates that individual populations are genetically distinct especially between Newnes Plateau and Blue Mountains populations. It is restricted to an isolated and naturally fragmented habitat of sedge and shrub swamps that have boggy soils and appear to be permanently wet. The vegetation in these swamps typically takes the form of a sedgeland interspersed with shrubs, but may occur as a dense shrub thicket (DECC 05).	No

Appendix A: Flora and Fauna Inventories

Flora species table

Family	Genus	Species	Common name	Native/Exotic	Type	Q1	Q2	Q3	Incidental species
Adiantaceae	*Cheilanthes*	*sieberi*	Rock Fern	Native	Herb				x
Apiaceae	*Centella*	*asiatica*	Indian Pennyworth	Native	Herb				x
	Platysace	*ericoides*		Native	Shrub			x	
	Platysace	*lanceolata*	Shrubby Playsace	Native	Shrub	x			
	Xanthosia	*pilosa*	Wolly Xanthosia	Native	Herb				
Aspleniaceae	*Asplenium*	*flabellifolium*	Necklace Fern	Native	Herb				
Asteraceae	*Cassinia*	*arcuata*	Sifton Bush	Native	Shrub	x	x		x
	Cirsium	*vulgare*	Spear Thistle	Exotic	Herb				
	Conyza	*sumatrensis*	Tall Fleabane	Exotic	Herb				
	Conyza	*bonariensis*	Flaxleaf Fleabane	Exotic	Herb				x

Family	Genus	Species	Common name	Native/Exotic	Type	Q1	Q2	Q3	Incidental species
	Conyza	sp.		Exotic	Herb				
Asteraceae	*Coronidium*	*oxylepis*		Native	Herb			x	
	Hypochaeris	*radicata*	Catsear	Exotic	Herb		x		x
	Lagenophora	*stipitata*	Blue Bottle-daisy	Native	Herb				x
	Ozothamnus	*diosmifolius*	Rice Flower	Native	Shrub				x
	Senecio	*sp.*		Exotic	Herb		x		
Blechnaceae	*Blechnum*	*cartilagineum*	Gristle Fern	Native	Herb				x
Brassicaceae	*Lepidium*	sp.		Native	Herb			x	
Campanulaceae	*Wahlenbergia*	sp.		Native	Herb		x		
Caryophyllaceae	*Stellaria*	*pungens*	Prickly Starwort	Native	Herb		x		
Casuarinaceae	*Allocasuarina*	*littoralis*	Dwarf She-oak	Native	Tree	x			
Clusiaceae	*Hypericum*	*perforatum*	St John's Wort	Exotic	Herb		x		
Convolvulaceae	*Dichondra*	*repens*	Kidney Weed	Native	Herb				x
Cyperaceae	*Caustis*	*flexuosa*	Curly Wig	Native	Sedge			x	

Family	Genus	Species	Common name	Native/Exotic	Type	Q1	Q2	Q3	Incidental species
	Gahnia	*aspera*	Rough Saw-sedge	Native	Sedge				x
Cyperaceae	*Lepidosperma*	*laterale*	Rapier Sedge	Native	Sedge				x
	Lepidosperma	*urophorum*		Native	Sedge				x
Dennstaedtiaceae	*Pteridium*	*esculentum*	Bracken	Native	Herb		x		x
Dicksoniaceae	*Calochlaena*	*dubia*	Rainbow Fern	Native	Herb				
Dilleniaceae	*Hibbertia*	*circumdans*		Native	Shrub				x
	Hibbertia	*riparia*	Erect Guinea-flower	native	Shrub	x			
Ericaceae - Styphelioideae	*Leucopogon*	sp. (ericoides)	Pink Beard-heath	native	Shrub	x			
	Leucopogon	*lanceolatus*		Native	Shrub				x
	Leucopogon	*muticus*	Blunt Beard-heath	Native	Shrub	x			
	Leucopogon	*virgatus*		native	Shrub	x		x	
	Lissanthe	*strigosa*	Peach Heath	Native	Shrub			x	
Euphorbiaceae	*Amperea*	*xiphoclada*	Broom Spurge	Native	Shrub				x
Fabaceae - Faboideae	*Dillwynia*	*retorta*		Native	Shrub		x	x	x

Family	Genus	Species	Common name	Native/Exotic	Type	Q1	Q2	Q3	Incidental species
Fabaceae – Faboideae	*Hardenbergia*	*violacea*	False Sarsparilla	Native	Shrub				x
	Mirbelia	*platylobioides*		Native	Shrub			x	
	Podolobium	*ilicifolium*	Prickly Shaggy Pea	Native	Shrub	x			x
	Pultenaea	*microphylla*		Native	Shrub		x	x	
Fabaceae - Mimosoideae	*Acacia*	*aspera*	Rough Wattle	Native	Shrub				x
	Acacia	*dealbata*	Silver Wattle	Native	Tree				x
	Acacia	*falciformis*	Broad-leaved Hickory	Native	Shrub				x
	Acacia	*leucolobia*	Wattle	Native	Shrub			x	
	Acacia	*longifolia*	Sydney Golden Wattle	Native	Shrub	x			x
	Acacia	*terminalis*	Sunshine Wattle	Native	Shrub				x
Geraniaceae	*Geranium*	*solanderi*	Native Geranium	Native	Herb				x
Goodeniaceae	*Goodenia*	*hederacea*	Forest Goodenia	Native	Herb	x			
	Goodenia	sp.		Native				x	
Haloragaceae	*Gonocarpus*	*tetragynus*		Native	Herb	x			

Family	Genus	Species	Common name	Native/Exotic	Type	Q1	Q2	Q3	Incidental species
Haloragaceae	*Gonocarpus*	*micranthus*		Native	Herb				
	Gonocarpus	*teucrioides*	Raspwort	Native	Herb			x	
Iridaceae	*Patersonia*	*sericea*	Silky Purple-flag	Native	Herb	x			
Lomandraceae	*Lomandra*	*confertifolia*		Native	Herb	x			
	Lomandra	*filiformis*	Wattle Mat-rush	Native	Herb		x	x	
	Lomandra	*glauca*	Pale Lomandra	Native	Herb	x		x	
	Lomandra	*longifolia*	Spiny-headed Matrush	Native	Herb	x	x		
	Lomandra	*multiflora*	Many-headed Matrush	Native	Herb		x		
Myrtaceae	*Baeckea*	*linifolia*	Weeping Baeckea	Native	Shrub				x
	Eucalyptus	*blaxlandii*	Blaxland's Stringybark	Native	Tree				x
	Eucalyptus	*cannonii*	Red Stringybark	Native	Tree				x
	Eucalyptus	*dalrympleana*	Mountain Gum	Native	Tree		x		x
	Eucalyptus	*dives*	Broad-leaved Peppermint	Native	Tree		x		x
	Eucalyptus	*fastigata*	Brown Barrel	Native	Tree				x

Family	Genus	Species	Common name	Native/Exotic	Type	Q1	Q2	Q3	Incidental species
	Eucalyptus	*macrorhyncha*	Red Stringybark	Native	Tree				
Myrtaceae	*Eucalyptus*	*mannifera*	Brittle Gum	Native	Tree				x
	Eucalyptus	*piperita*	Sydney Peppermint	Native	Tree				x
	Eucalyptus	*punctata*	Grey Gum	Native	Tree				x
	Eucalyptus	*rossii*	Inland Scribbly Gum	Native	Tree	x			x
	Eucalyptus	*sclerophylla*	Hard-leaved Scribbly Gum	Native	Tree	x			x
	Eucalyptus	*sieberi*	Silvertop Ash	Native	Tree				x
	Eucalyptus	sp.		Native	Tree			x	
	Eucalyptus	*sparsifolia*	Narrow-leaved Stringybark	Native	Tree				x
	Kunzea	*ambigua*	Tick Bush	Native	Shrub				x
	Leptospermum	*continentale*	Prickly Tea-tree	Native	Shrub		x		
	Leptospermum	*grandifolium*	Woolly Teatree	Native	Shrub	x			
	Leptospermum	*macrocarpum*		Native	Shrub			x	
	Leptospermum	*polygalifolium*	Tantoon	Native	Shrub				x

Family	Genus	Species	Common name	Native/Exotic	Type	Q1	Q2	Q3	Incidental species
Myrtaceae	*Leptospermum*	*trinervium*	Flaky-barked Tea-tree	Native	Shrub	x		x	
Orchidaceae	*Eriochilus*	*cucullatus*		Native	Orchid			x	x
	Eriochilus	sp.		Native	Orchid		x		
	Pterostylis	sp.		Native	Orchid				x
Osmundaceae	*Todea*	*barbara*	King Fern	Native	Herb				x
Phormiaceae	*Dianella*	*revoluta*	Blue Flax-lily	Native	Herb	x	x	x	x
	Stypandra	*glauca*	Nodding Blue-lily	Native	Herb				x
Phyllanthaceae	*Poranthera*	*microphylla*		Native	Herb				x
Pinaceae	*Pinus*	*radiata*	Radiata Pine	Exotic	Tree				x
Pittosporaceae	*Billardiera*	*scandens*	Hairy Apple Berry	Native	Shrub				
Plantaginaceae	*Veronica*	*perfoliata*	Digger's Speedwell	Native	Herb				x
Poaceae	*Aristida*	*ramosa*	Purple Wiregrass	Native	Grass			x	
	Aristida	sp.	Wiregrass	Native	Grass				
	Austrodanthonia	sp.	Wallaby Grass	Native	Grass		x		x

Family	Genus	Species	Common name	Native/Exotic	Type	Q1	Q2	Q3	Incidental species
	Austrostipa	sp.	Speargrass	Native	Grass	x			
	Dichelachne	*inaequiglumis*		Native	Grass			x	
	Dichelachne	sp.		Native	Grass		x		
	Dichelachne	*rara*		Native	Grass				x
Poaceae	*Echinopogon*	*ovatus*	Forest Hedgehog Grass	Native	Grass		x		
	Echinopogon	*caespitosus*	Brushy Hedgehog-Grass	Native	Grass				x
	Entolasia	*stricta*	Wiry Panic	Native	Grass				x
	Joycea	*pallida*	Silvertop Wallaby Grass	Native	Grass	x	x	x	
	Microlaena	*stipoides*	Weeping Grass	Native	Grass	x	x		x
	Poa	*sieberiana*	Tussock Grass	Native	Grass	x	x	x	
	Themeda	*australis*	Kangaroo Grass	Native	Grass		x		x
Polypodiaceae	*Microsorum*	*scandens*	Fragrant Fern	Native	Herb				x
	Pyrrosia	*rupestris*	Rock Felt Fern	Native	Herb				x
Proteaceae	*Banksia*	*spinulosa* var. *collina*	Hairpin Banksia	Native	Shrub	x			x

Family	Genus	Species	Common name	Native/Exotic	Type	Q1	Q2	Q3	Incidental species
Proteaceae	*Grevillea*	sp.		Native	Shrub			x	x
	Hakea	*dactyloides*	Finger Hakea	Native	Shrub				x
	Isopogon	*anemonifolius*	Broad-leaved Drumsticks	Native	Shrub	x			
	Lomatia	*myricoides*	River Lomatia	Native	Shrub				x
	Persoonia	*linearis*	Narrow-leaved Geebung	Native	Shrub				x
	Persoonia	*mollis*	Soft Geebung	native	Shrub	x	x	x	
Pteridaceae	*Pellaea*	*falcata*	Sickle Fern	Native	Herb				x
Ranunculaceae	*Clematis*	*aristata*	Old Man's Beard	Native	Vine				x
	Clematis	*glycinoides*	Headache Vine	Native	Vine				x
Rosaceae	*Rubus*	*fruticosus*	Blackberry	Exotic	Shrub				x
Rubiaceae	*Galium*	*binifolium*		Native	Herb				x
	Opercularia	*aspera*	Coarse Stinkweed	Native	Herb		x		
	Opercularia	*hispida*	Hairy Stickweed	Native	Herb		x		
	Pomax	*umbellata*		Native	Shrub	x			x

Family	Genus	Species	Common name	Native/Exotic	Type	Q1	Q2	Q3	Incidental species
Rutaceae	*Boronia*	*microphylla*	Small Leaved Boronia	Native	Shrub			x	x
Rutaceae	*Zieria*	cytisoides	Downy Zieria	Native	Shrub				x
Santalaceae	*Exocarpos*	*cupressiformis*	Cherry Ballart	Native	Shrub				x
	Leptomeria	*acida*	Native Currant	Native	Shrub				x
	Omphacomeria	*acerba*		Native	Herb				x
Scrophulariaceae	*Veronica*	*plebeia*	Creeping Speedwell	Native	Herb		x		x
Stylidiaceae	*Stylidium*	*graminifolium*	Grass Trigger-plant	Native	Herb			x	
	Stylidium	*lineare*	Narrow-leaved Triggerplant	Native	Herb			x	x
	Stylidium	*productum*		Native	Herb				x
Violaceae	*Viola*	*betonicifolia*	Native Violet	Native	Herb		x		
	Viola	*hederacea*	Ivy-leaved Violet	Native	Herb				
				Native total	**124**				

Fauna species table

Class	Family	Genus	Species	Common name
Aves	Acanthizidae	*Acanthiza*	sp.	Thornbill
		Gerygone	*fusca*	Western Gerygone
	Accipitridae	*Aquila*	*audax*	Wedge-tailed Eagle
	Artamidae	*Cracticus*	*tibicen*	Australian Magpie
		Strepera	*graculina*	Pied Currawong
	Cacatuidae	*Cacatua*	*galerita*	Sulphur-crested Cockatoo
		Calyptorhynchus	*funereus*	Yellow-tailed Black Cockatoo
	Climacteridae	*Climacteris*	*erythrops*	Red-browed Treecreeper
		Cormobates	*leucophaeus*	White throated Tree-creeper
	Cuculidae	*Chalcites*	*basalis*	Horsfield's Bronze-Cuckoo
	Halcyonidae	*Dacelo*	*novaeguineae*	Laughing Kookaburra
	Meliphagidae	*Anthochaera*	*carunculata*	Red Wattle Bird
		Manorina	*melanocephala*	Noisy Miner
	Menuridae	*Menura*	*novaehollandiae*	Superb Lyrebird
	Petroicidae	*Eopsaltria*	*australis*	Eastern Yellow Robin
		Petroica	*boodang*	Scarlet Robin
	Rhipiduridae	*Rhipidura*	*albiscapa*	Grey Fantail
Mammalia	Leporidae	*Oryctolagus*	*cuniculus*	European Rabbit
	Macropodidae	*Macropus*	*giganteus*	Eastern Grey Kangaroo
		Macropus	*rufogriseus*	Red-necked Wallaby
		Wallabia	*bicolor*	Swamp Wallaby
	Phalangeridae	*Trichosurus*	sp.	Brush-tailed Possum

Class	Family	Genus	Species	Common name
	Pseudocheiridae	*Petauroides*	*volans*	Greater Glider
	Vombatidae	*Vombatus*	*ursinus*	Common Wombat
	Anabat Results			
	Miniopteridae	***Miniopterus***	***schreibersii oceanensis***	Eastern Bentwing-bat
	Molossidae	*Tadarida*	*australis*	White-striped Free-tailed Bat
	Rhinolophidae	*Rhinolophus*	*megaphyllus*	Eastern Horseshoe-bat
	Vespertilionidae	*Chalinolobus*	*gouldii*	Gould's Wattled Bat
	Vespertilionidae	*Chalinolobus*	*morio*	Chocolate Wattled Bat
	Vespertilionidae	***Myotis macropus/****Nyctophilus sp.*		
	Vespertilionidae	*Nyctophilus*	*sp.*	
	Vespertilionidae	*Vespadelus*	*darlingtoni*	Large Forest Bat
	Vespertilionidae	*Vespadelus*	*vulturnus*	Little Forest Bat
Reptilia	Elapidae	*Pseudechis*	*porphyriacus*	Red-bellied Black Snake

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