Key:
1 = rare in quadrat
2 = occasional
3 = common but less than 5% cover
4a = very common but less than 5% cover
4b = 5-25% cover
5 = 25-50% cover
6 = 50-75% cover
7 = 75-100% cover
* = introduced species
# = occurs in similar vegetation in vicinity of quadrat

Appendix C: Koala Habitat Survey Data

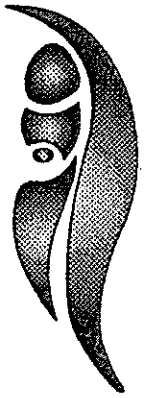
Date: 26/08/02	Location: AIRDS	Quadrat: 1	Details: 40 x 40 behind youth centre		
Tree Species	**height (m)**	**Circum.**	**scats**	**scratch**	**comment**
E. moluccana	15	131	No	No	
E. moluccana	15	120	No	No	
E. moluccana	12	93	No	No	
E. moluccana	8	57	No	No	
E. moluccana	6	50	No	No	
E. moluccana	6	40	No	No	
E. moluccana	6	48	No	No	
E. moluccana	6	34	No	No	
E. moluccana	15	215	No	No	
E. moluccana	8	63	No	No	
E. moluccana	10	70	No	No	
E. moluccana	15	119	No	No	
E. moluccana	6	53	No	No	
E. moluccana	15	124	No	No	
Acacia amplexa	2	19	No	No	
E. moluccana	10	68	No	No	
E. moluccana	12	120	No	No	
E. moluccana	12	171	No	No	
E. moluccana	10	79	No	No	
E. moluccana	6	57	No	No	
E. moluccana	8	62	No	No	
E. moluccana	7	45	No	No	
E. moluccana	12	149	No	No	
E. moluccana	7	56	No	No	
E. moluccana	10	81	No	No	
E. tereticornis	8	99	No	No	*M. corneovirens* - 2 live specimens, one shell scratchings (not Koala)
E. tereticornis	8	80	No	No	

Date: 26/08/02 aged housing	Location: AIRDS	Quadrat: 2	Details: 40 x 40 between youth centre &		
Tree Species	**height (m)**	**circumference**	**Scats**	**Scratch**	**comment**
E. fibrosa	20-25	249	No	No	
E. tereticornis	18-20	114	No	No	
E. tereticornis	18-20	126	No	No	
E. crebra	10	97	No	No	
E. tereticornis	12	130	No	No	
E. moluccana	12	118	No	No	
E. crebra	6	129	No	No	
E. fibrosa	20-25	222	No	No	
E. moluccana	15	156	No	No	

Date: 26/08/02 Location: AIRDS Quadrat: 3 Details: 40 x 40 East of Southern end of bus depot					
Tree Species	**height (m)**	**circumference**	**Scats**	**Scratch**	**comment**
E. tereticornis	2-3	<10			25
E. tereticornis	20-25	272	No	No	18
E. tereticornis	4	38	No	No	
E. tereticornis	4	39	No	No	
E. tereticornis	6	45	No	No	
E. tereticornis	4	32	No	No	
E. tereticornis	4	31	No	No	
E. tereticornis	3	31	No	No	
E. tereticornis	4	35	No	No	
E. moluccana	5	31	No	No	
E. tereticornis	6	61	No	No	
E. tereticornis	6	35	No	No	markings but not koala
E. tereticornis	6	48	No	No	
E. tereticornis	3	31	No	No	
E. tereticornis	5	47	No	No	
E. tereticornis	4	36	No	No	
E. tereticornis	6	52	No	No	
E. tereticornis	6	46	No	No	scratches not koala
E. tereticornis	10	105	No	No	
E. tereticornis	4	31	No	No	
E. tereticornis	4	43	No	No	
E. crebra	15	114	No	No	
E. tereticornis	10	39	No	No	
E. moluccana	15	117	No	No	
E. tereticornis		<10	No	No	39
E. tereticornis	5	55	No	No	
E. moluccana	4	40	No	No	
E. tereticornis	4	50	No	No	
E. tereticornis	3	33	No	No	
E. tereticornis	3	38	No	No	
E. tereticornis	3	32	No	No	scratches not koala
E. tereticornis	2-3	30.5	No	No	scratches not koala
E. tereticornis	5	47	No	No	scratches not koala
E. tereticornis	5	49	No	No	
E. moluccana	12	99	No	No	
E. tereticornis	3	32	No	No	
Acacia amplexa		<10	No	No	4
E. tereticornis		<10	No	No	45
E. tereticornis	2-3	30.5	No	No	
E. tereticornis	2	31	No	No	
E. tereticornis	4	77	No	No	scratches not koala
E. tereticornis	3	50	No	No	
E. tereticornis	<10				9

Date: 26/08/02 Location: AIRDS Transect: 4 Details: 50 x 10 below end of transmission easement					
Tree Species	**Height (m)**	**circumference**	**Scats**	**Scratch**	**Comment**
Acacia amplexa	4	45	No	No	
A. floribunda		<10			4
E. punctata		<10			3
E. ironbark?		<10			1
E. tereticornis		<10			4
A. floribunda	3	40	No	No	
A. floribunda	4	40	No	No	
A. floribunda	4	51	No	No	
A. floribunda	3	42		No	
A. floribunda	3	36		No	
Acacia decurrens	3	45		No	
A. floribunda	20-25	213		No	
E. punctata	12	142		Y	old probably koala
Acacia amplexa		<10			3
Acacia decurrens	2	37	No	No	
A. floribunda	2	44	No	No	
A. floribunda	3	42		No	

Date: 26/08/02 Location: AIRDS Area: 5 Details: between Smiths creek & road					
Tree Species	**height (m)**	**circumference**	**Scats**	**Scratch**	**comment**
E. tereticornis	3-4	75	Kikuyu	No	
E. tereticornis	10	187	Kikuyu	Maybe	
E. tereticornis	20	154	Kikuyu	No	
Acacia amplexa?	8	110	Kikuyu	No	
E. tereticornis	15	97		No	
E. tereticornis	12	115		No	
E. tereticornis	10	89		No	
E. tereticornis	6-8	81		No	
E. tereticornis	15-20	288			



ANNE CLEMENTS & ASSOCIATES PTY. LIMITED
(ABN 41 077 242 365, ACN 077-160-939)
Environmental and Botanical Consultants
PO Box 1623, North Sydney 2059
Phone: (02) 9955 3362, Facsimile: (02) 9957 4343
Email: mail@acabotanic.com

25 March 2003

Flora assessment:

Landcom owned land in the Airds/Bradbury housing estate

Prepared by:

Dr AnneMarie Clements
Sian Wilkins
Jane Rodd
Emma Gorrod
Tony Rodd

Prepared for:

Landcom
Luis Valarezo
Level 2, 330 Church Street
Parramatta
NSW, 2150
Phone: 9841 8600
Fax: 9841 8688

Contents

- actions that have a significant impact on matters of national environmental significance (NES),
- actions that have a significant impact on the environment of Commonwealth land, and
- actions carried out by the Commonwealth Government.

A search of Environment Australia's on-line database revealed 13 species listed on the EP&BC Act 1999 recorded within an approximate 10 km radius of the Site, namely:

Species	Status	Habitat
Acacia bynoeana	V	Mainly in heath and dry sclerophyll forest on sandy soils; south of Dora Creek-Morisset area to Berrmia and the Illawarra Region, west to the Blue Mtns.
Caladenia tessellata	V	Grows on clay, loam or sandy soils; south from Swansea.
Cryptostylis hunteriana	V	Grows on swamp heath on sandy soils, chiefly in coastal districts, south from the Gibraltar Range.
Cynanchum elegans	E	Recorded from rainforest gullies scrub and scree slopes; from the Gloucester district to the Wollongong area and inland to Mt Dangar.
Eucalyptus benthamii	V	Restricted but locally abundant, in wet forest on sandy alluvial soils along valley floors; confined to the lower Nepean R. and Kedumba Valley.
Grevillea parviflora subsp. *parviflora*	V	Light clayey soils in woodlands. Prospect to Camden and Appin (Final Determination 12 June 1998).
Leucopogon exolasius	V	Grows in woodland on sandstone, restricted to the Woronora and Grose Rivers and Stokes Creek.
Melaleuca deanei	V	Grows in wet heath on sandstone, coastal districts from Berowra to Nowra.
Persoonia bargoensis	V	Grows in woodland to dry sclerophyll forest, on sandstone and laterite; restricted to the Bargo area.
Pimelea spicata	E	The distribution of *P. spicata* is relatively scattered and it occurs in two disjunct areas: the Cumberland Plain and coastal Illawarra (NPWS 2000b).
Pomaderris brunnea	V	In open forest, confined to the Colo River and upper Nepean River.
Pterostylis saxicola	E	Grows in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. Vegetation above the shelves in either shale/sandstone transition or shale communities. From Picnic Point to Picton area (Final Determination dated 31 October 1997).
Pultenaea aristata	V	Grows in moist, dry sclerophyll woodland to heath on sandstone; Helensburg to Mt Keira.

V – Vulnerable and E – Endangered.

None of these species were recorded on the Site.

4.2.2 State

The NPWS Atlas of NSW Wildlife (extracted 7 January 2003) contained records of ten threatened species for the Campbellown LGA, namely:

Species	Status	Habitat
Acacia pubescens	V	Usually grows in open sclerophyll forest and woodland on clay soils; Bilpin to Georges River area, also recorded at Woodford.
Acacia rivalis	E1	Found in River Red Gum communities bordering ephemeral streams, recorded only from Broken Hill district. Tame (1992) concurs. This species is unlikely to naturally occur within Campbelltown LGA.
Grevillea parviflora subsp. *parviflora*	V	See above in National listing.
Gyrostemon thesioides	E1	Fire-opportunist. Confined to the Georges and Nepean Rivers.
Leucopogon exolasius		See above in National listing.
Melaleuca deanei	V	See above in National listing.
Persoonia hirsuta subsp. *hirsute*	E1	Grows in woodland to dry sclerophyll forest on sandstone. Occurs as isolated individuals or very small populations.
Persoonia nutans	E1	Grows in woodland to dry sclerophyll forest on laterite and alluvial sand; confined to the Cumberland Plain.
Pimelia spicata	E1	See above in National listing.
Pterostylis saxicola	E1	See above in National listing.

V – Vulnerable and E1 – Endangered.

An additional three species were listed by NPWS (2000b) as having been recorded in the Campbelltown LGA, namely:

Species	Status	Habitat
Acacia bynoeana	V	See above in National listing.
Astrotricha crassifolia	V	Grows in dry sclerophyll woodland on sandstone, near Patonga and in Royal N.P.
Pomaderris brunnea	V	See above in National listing.

None of these species of state significance were recorded on the Site.

4.2.3 Regional

James *et al.* (1999) describe the Campbelltown LGA as having "about 612 native species including 85 species of regional significance and 42% of species considered vulnerable in Western Sydney".

The regional (Western Sydney) conservation status of each species (James *et al.* 1999) was assessed as:

- **Regionally significant species** – includes those endemic to the Western Sydney area, those regarded as rare and endangered at national and state levels, species that are rare in the region or with disjunct populations, species restricted to endangered habitats, species at or close to geographic limits and species believed to be extinct. At the time of publication of James *et al.* (1999), 30% of plants recorded for Western Sydney were considered to be of particular regional significance.
- **Vulnerable species** - not known to be conserved within three or more dedicated conservation reserves in Western Sydney or in the adjacent sandstone areas. At the time of publication of James *et al.* (1999), 60% of plants recorded for Western Sydney were considered to be regionally vulnerable and inadequately conserved.

Of the native species recorded within the Site, 12 were considered to be 'regionally vulnerable' for Western Sydney, namely:

Species	Sampling locations
Arthropodium milleflorum	Transect 6
Austrodanthonia racemosa	Transects 3, 4, 6
Bothriochloa decipiens	Transect 7
Brachychiton populneus subsp. *populneus*	Spot location C
Carex inversa	Spot location A
Chloris ventricosa	Transects 1, 2
Einadia nutans	Transect 2
Einadia trigonos subsp. *trigonos*	Transect 2, 7 and Spot location A
Elymus scaber	Transect 4
Olearia viscidula	Transect 5
Opercularia hispida	Transect 4
Vittadinia cuneata var. *cuneata*	Transect 6

5.0 Noxious weeds

The NSW Agriculture *Noxious Weeds List* (extracted 22 January 2003) identifies 49 noxious weeds for the Campbelltown LGA (Appendix 5). Four of the 22 exotic species recorded in the current survey are declared noxious weeds in the Campbelltown LGA, namely:

Species	Category	Sampling location recorded
Lantana camara	W2	Spot location D
Ligustrum lucidum	W4b	Transect 3
Ligustrum sinense	W4b	Transect 5
Myrsiphylum asparagoides syn. *Asparagus asparagoides*	W4c	Transect 7

W2: The weed must be fully and continuously suppressed and destroyed.

W4b: The weed must not be sold, propagated or knowingly distributed and any existing weed must be prevented from flowering and fruiting.

W4c: The weed must not be sold, propagated or knowingly distributed and the weed must be prevented from spreading to an adjoining property.

6.0 Conclusions

A total of 75 species were recorded on the Site, 53 of which were native. Of the 22 exotic species recorded on the Site, four are listed as noxious weeds in the Campbelltown LGA.

There were no national or state listed threatened species recorded on the Site in the current survey. There were 12 regionally significant species for the Western Sydney Region recorded on the Site.

The vegetation of the approximately 1.4 ha Site appears to meet the National (EP&BC Act) and State (TSC Act) listed criteria for the endangered ecological community Cumberland Plain Woodland in terms of location, substrate, structure and species present, with 46% of the national listed characteristic species, 47% of state listed characteristic species and three of the five characteristic dominant tree species recorded on the Site.

At the time of survey, the vegetation on the Site was highly disturbed, with a long history of understorey clearing and mowing, rubbish dumping, fragmentation by tracks, clearing for powerlines, and past grazing land use (based on the widespread occurrence of *Paspalum dilatatum* on the Site).

The current mowing regime on the Site is not appropriate management of the endangered ecological community identified on the Site, Cumberland Plain Woodland. Mowing is likely to be required for bushfire management, especially in the north of the Site adjoining the existing residential development.

The tree canopy of the Site is not intact. The number of individual trees greater than a maximum height of 12 m recorded in the 10 m x 10 m quadrats, using data in Table 4, ranged from 0 to 4 individuals, with:

- 62% of the quadrats having 0 or 1 individuals
- 81% of the quadrats having $\leq$ 2 individuals

The patchy nature of the vegetation (see the 2002 aerial photograph, Figure 5) is consistent with the data collected in the current study. This is not consistent with NPWS (2002) mapping of intact vegetation with >10% canopy cover.

In terms of connectivity, the 1.4 ha patch of vegetation meeting the criteria for Cumberland Plain Woodland has:

- to the east and north, no bushland connectivity,
- to the south, mainly sealed car park with scattered trees and mown understorey to the south-west,
- to the west, vehicle tracks and a powerline easement up to 60 m total width with degraded vegetation further west.

This patch of vegetation is unlikely to be self sustaining in the long term due to:

- presence of exotic species,
- lack of connectivity to other bushland patches,
- relatively small size, and
- cleared understorey.

In conclusion, the patch of Cumberland Plain Woodland on the Site is:

- highly degraded,

- unlikely to be self sustaining in the long term,
- unlikely to naturally regenerate, unless there was a change in management and ongoing financial commitment from Council and adjoining residents to the bush regeneration of this 1.4 ha isolated patch.

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Tables

Table 1. Review of historical aerial photographs of the Site

Date	Site	Surrounds
22 February 2002	Scattered trees with grass understorey with many tracks criss crossing	North: Scattered trees with grass understorey, Georges River Road East: Area to the east of the bus depot is grassed. Further to the east is housing South: Grass strip to the south and housing West: Ovals and housing Centre-west: Bus Depot
4 January 1994	Few scattered trees in the east and west with grass understorey	Area to the north has fewer trees than 2001, grass understorey Very similar to 2002
8 October 1984	As for 1994	Very similar to 2002
29 June 1979	Cleared as for 2002	North: As for 1994 except more trees in the north-west and an additional building in the south of the area East: similar to 2002 South: similar to 2002 West: Buildings and cleared areas Centre-west: Bus Depot being constructed
28 June 1972	Trees with a cleared understorey	North: Georges River Road is a different shape East: Residential area being constructed West: Cleared, no houses Centre-west: Bus depot not present but area cleared
1961	Trees with a cleared understorey	North: Georges River Road East: Mostly cleared, thin strip of vegetation connecting with larger vegetated area to the east South: Cleared West: Cleared Centre-west: Orchard and a few buildings
15 January 1947	Scattered trees with patchy shrub layer	Very similar to 1961. Agriculture widespread.

Table 2 - Botanical and common names of all species recorded

Note: asterisk before botanical name signifies non-native species

Botanical name	Common name
3. Dicotyledons	
Acanthaceae	
Brunoniella australis	Blue Trumpet, Blue Yam
Asteraceae	
Olearia viscidula	Wallaby Weed, Sticky Daisy-bush
* Osteospermum ecklonis	Sailor-boy Daisy
* Senecio macroglossus	Natal Ivy
* Senecio madagascariensis	Fireweed, Madagascar Ragwort
* Taraxacum officinale	Dandelion
Vittadinia cuneata var. cuneata	Fuzzweed
Bignoniaceae	
* Tecoma capensis	Cape Honeysuckle
Chenopodiaceae	
Einadia hastata	Berry Saltbush
Einadia nutans	Climbing Saltbush
Einadia trigonos subsp. trigonos	Fishweed
Convolvulaceae	
Dichondra repens	Kidney Weed
Crassulaceae	
* Crassula multicava	
* Crassula ovata	Jade Tree, Friendship Tree, Money Tree
Euphorbiaceae	
Breynia oblongifolia	Coffee Bush
Fabaceae Caesalpinioideae	
* Senna pendula var. glabrata	
Fabaceae Faboideae	
Daviesia ulicifolia subsp. stenophylla	Gorse Bitter-pea
Desmodium varians	Slender Tick-trefoil
Glycine clandestina	Twining Glycine
Glycine sp.	
Hardenbergia violacea	False Sarsaparilla
Indigofera australis	Native Indigo
Fabaceae Mimosoideae	
Acacia decurrens	Black Wattle
Acacia implexa	Lightwood, Hickory
Acacia parramattensis	Sydney Green Wattle
Haloragaceae	
Gonocarpus tetragynus	Raspwort
Linaceae	
* Linum trigynum	French Flax
Malvaceae	
* Modiola caroliniana	Red-flower Mallow
* Sida rhombifolia	Paddy's Lucerne
Myrtaceae	
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus fibrosa	Broad-leaved Red Ironbark
Eucalyptus moluccana	Grey Box
Eucalyptus sp.	
Eucalyptus tereticornis	Forest Red Gum
Kunzea ambigua	Tick-bush

Botanical name	Common name
Oleaceae	
* Ligustrum lucidum	Broad-leaved Privet
* Ligustrum sinense	Small-Leaved Privet, Chinese Privet
Notelaea longifolia	Mock-olive
* Olea europaea subsp. africana	African Olive, Smallfruited Olive
Pittosporaceae	
Bursaria spinosa var. spinosa	Australian Boxthorn
Plantaginaceae	
* Plantago lanceolata	Plantain, Ribwort
Rubiaceae	
Opercularia hispida	Stinkweed
Santalaceae	
Exocarpos cupressiformis	Cherry Ballart, Native Cherry
Sterculiaceae	
Brachychiton populneus subsp. populneus	Kurrajong
Verbenaceae	
* Lantana camara	Lantana
4. Monocotyledons	
Anthericaceae	
Arthropodium milleflorum	Vanilla Lily
Tricoryne elatior	Yellow Rush Lily
Asparagaceae	
* Myrsiphyllum asparagoides	Florists' Smilax
Commelinaceae	
* Tradescantia albiflora	Wandering Jew
Cyperaceae	
Carex inversa	Knob Sedge
Lomandraceae	
Lomandra filiformis subsp. filiformis	Wattle Mat-rush
Lomandra multiflora	Many-flowered Mat-rush
Phormiaceae	
Dianella longifolia	Smooth Flax-lily
Dianella revoluta	Blue Flax-lily, Spreading Flax-lily
Poaceae	
Aristida ramosa var. ramosa	Wiregrass
Aristida sp.	Wiregrass
Aristida vagans	Wiregrass
Austrodanthonia racemosa	Ringed Wallaby Grass
Bothriochloa decipiens	Redleg Grass, Pitted Bluegrass
Chloris ventricosa	Tall Windmill Grass
Cymbopogon refractus	Barbed-wire Grass
Cynodon dactylon	Couch, Bermuda Grass
Echinopogon ovatus	Forest Hedgehog Grass
Eleusine tristachya	Goose Grass, Crab Grass
Elymus scaber	Rough Wheatgrass
Entolasia stricta	Wiry Panic
Eragrostis leptostachya	Paddock Lovegrass
* Lolium perenne	Perennial Ryegrass
Microlaena stipoides	Meadow Rice-grass, Weeping Grass
Paspalidium distans	
* Paspalum dilatatum	Paspalum
* Pennisetum clandestinum	Kikuyu
Sporobolus creber	Slender Rat's-tail Grass

Botanical name	Common name
* Sporobolus indicus var. capensis	Parramatta Grass
Themeda australis	Kangaroo Grass

Table 3 - Species recorded in Transects 1 - 7 and Spot locations A - D at Airds

Notes: 1. asterisk before botanical name signifies non-native species

2. for common names see Table 2

	Sampling location										
	T1	T2	T3	T4	T5	T6	T7	A	B	C	D
3. Dicotyledons											
Acanthaceae											
Brunoniella australis	1		1		1	2					
Asteraceae											
Olearia viscidula					1						
* Osteospermum ecklonis											X
* Senecio macroglossus		1									
* Senecio madagascariensis		1									
* Taraxacum officinale							1				
Vittadinia cuneata var. cuneata						1					
Bignoniaceae											
* Tecoma capensis							1				
Chenopodiaceae											
Einadia hastata		1									
Einadia nutans		3									
Einadia trigonos subsp. trigonos		3					2	X			
Convolvulaceae											
Dichondra repens		1	1	2	3	2	3				
Crassulaceae											
* Crassula multicava											X
* Crassula ovata		1									
Euphorbiaceae											
Breynia oblongifolia			1								
Fabaceae Caesalpinioideae											
* Senna pendula var. glabrata								X			
Fabaceae Faboideae											
Daviesia ulicifolia subsp. stenophylla					1						
Desmodium varians			1								
Glycine clandestina	1	1		2	2	1	2	X			
Glycine sp.		1									
Hardenbergia violacea	1			2	1			X			
Indigofera australis			1		2						
Fabaceae Mimosoideae											
Acacia decurrens		2			2		1	X			X
Acacia implexa							1		X		X
Acacia parramattensis			1								
Haloragaceae											
Gonocarpus tetragynus				1							
Linaceae											
* Linum trigynum	1										
Malvaceae											
* Modiola caroliniana		1					1				
* Sida rhombifolia		3	1			1	3				
Myrtaceae											
Eucalyptus crebra			1			1					
Eucalyptus fibrosa	1			2	2			X			
Eucalyptus moluccana	2	2	2	1		3	3				X
Eucalyptus sp.								X			
Eucalyptus tereticornis		1	1	1		2	2				X
Kunzea ambigua			1								

	Sampling location										
	T1	T2	T3	T4	T5	T6	T7	A	B	C	D
Oleaceae											
* Ligustrum lucidum			1								
* Ligustrum sinense					1						
Notelaea longifolia				1							
* Olea europaea subsp. africana				1	1			X			
Pittosporaceae											
Bursaria spinosa var. spinosa	3	1	1	2	3	1		X			
Plantaginaceae											
* Plantago lanceolata	2	2	1	2	3	3	2	X			
Rubiaceae											
Opercularia hispida				1							
Santalaceae											
Exocarpos cupressiformis		1	1			1					
Sterculiaceae											
Brachychiton populneus subsp. populneus										X	
Verbenaceae											
* Lantana camara											X
4. Monocotyledons											
Anthericaceae											
Arthropodium milleflorum						1					
Tricoryne elatior					1						
Asparagaceae											
* Myrsiphyllum asparagoides							1				
Commelinaceae											
* Tradescantia albiflora											X
Cyperaceae											
Carex inversa								X			
Lomandraceae											
Lomandra filiformis subsp. filiformis	3	3	3	3	2	2	1	X			
Lomandra multiflora		1		1	1			X			
Phormiaceae											
Dianella longifolia				1							
Dianella revoluta						1					
Poaceae											
Aristida ramosa var. ramosa	1										
Aristida sp.			3	1		1					
Aristida vagans	3	1			1						
Austrodanthonia racemosa			1	3		1					
Bothriochloa decipiens							1				
Chloris ventricosa	1	1									
Cymbopogon refractus	3			1				X			
Cynodon dactylon	1	2	1	1	1	1	3				
Echinopogon ovatus	1	1									
Eleusine tristachya		3									
Elymus scaber				1							
Entolasia stricta					1						
Eragrostis leptostachya							1				
* Lolium perenne							1				
Microlaena stipoides		2			2		1				
Paspalidium distans	1	1		2	1	2	1	X			
* Paspalum dilatatum	2	3	1	2	1	2	3	X			
* Pennisetum clandestinum							1				
Sporobolus creber	1										
* Sporobolus indicus var. capensis	1				1						
Themeda australis	1	2	3	3	3	3	2	X			

Table 4. Maximum height and number of individuals per 10 m x 10 m quadrat for species >2 m height within each transect

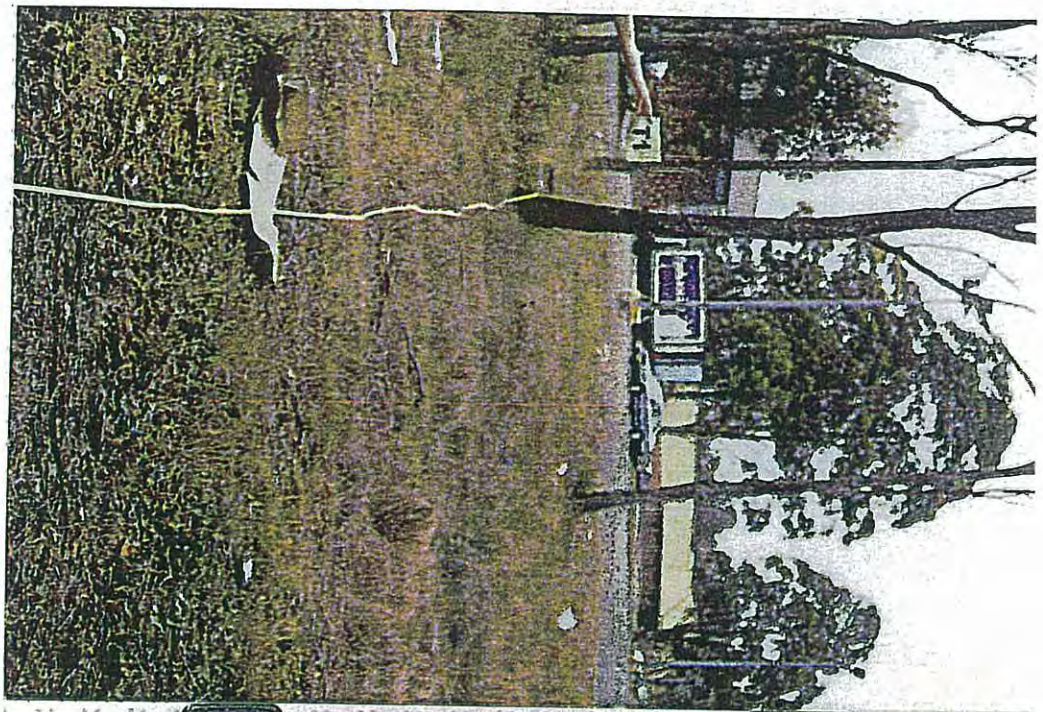
Transect / Species	Quadrat 1		Quadrat 2		Quadrat 3	
	Number	Height (m)	Number	Height (m)	Number	Height (m)
Transect 1						
Eucalyptus fibrosa					1	17
Eucalyptus moluccana	3	13			1	15
Transect 2						
Acacia decurrens	25	5	17	6		
Eucalyptus moluccana	2	12			1	12
Eucalyptus tereticornis	2	12				
Exocarpus cupresssiformis					1	5
Transect 3						
Eucalyptus tereticornis	1	15				
Eucalyptus moluccana	1	15			1	16
Exocarpus cupressiformis	1	3				
Transect 4						
Eucalyptus fibrosa	1	18			1	18
Eucalyptus moluccana			1	17		
Eucalytpus tereticornis					1	17
Notolaea longifolia	1	2				
Transect 5						
Acacia decurrens	1	6			1	15
Eucalyptus fibrosa	1	15	1	15		
Transect 6						
Eucalyptus crebra					1	17
Eucalyptus moluccana	1	18	1	17	2	18
Eucalyptus tereticornis	1	13			1	15
Transect 7						
Acacia decurrens					1	3
Eucalyptus moluccana	1	16	1	16	1	16
Eucalyptus tereticornis	3	12			1	8

Appendix 1
Monthly rainfall data for 2000 to 2003 at Campbelltown swimming pool meteorological station

Monthly rainfall data for 2000 to 2003 at Campbelltown swimming pool Meteorological Station

Element description	Year(s)	January	Februar	March	April	May	June	July	August	Sept	October	ovembe	December	Annual
Number of days with rain	2001	4	6	8	5	6	2	7	3	3	5	8	3	60
Number of days with rain	2002	6	12	7	3	4	2	3	3	1	1	4	5	51
Number of days with rain	2003	3												
Total monthly rainfall in m	2001	50	77	104	51	40	3	40	16	38	30	32	9	490
Total monthly rainfall in m	2002	50	195	96	14	34	24	52	14	1	1	9	29	519
Total monthly rainfall in m	2003	25												

Appendix 2
Photographic record



Transect 1
Southern corner of the Site

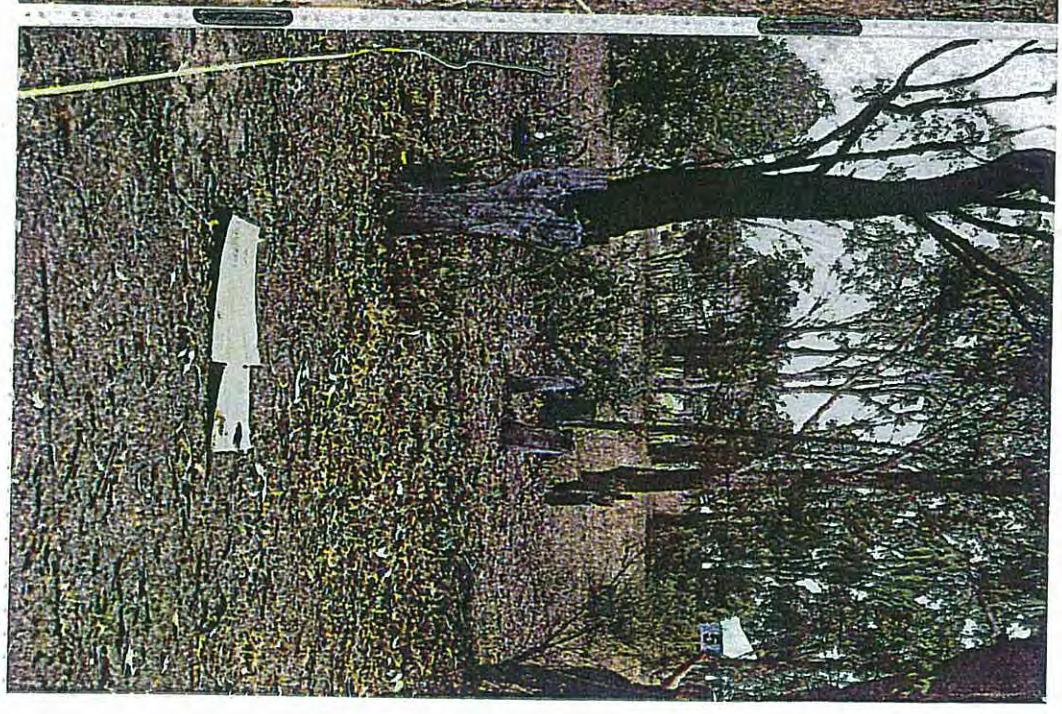
Transect 2
Stand of *Eucalyptus tereticornis* and *Acacia decurrens*

Transect 3
Eucalyptus tereticornis and *Exocarpos cupressiformis*

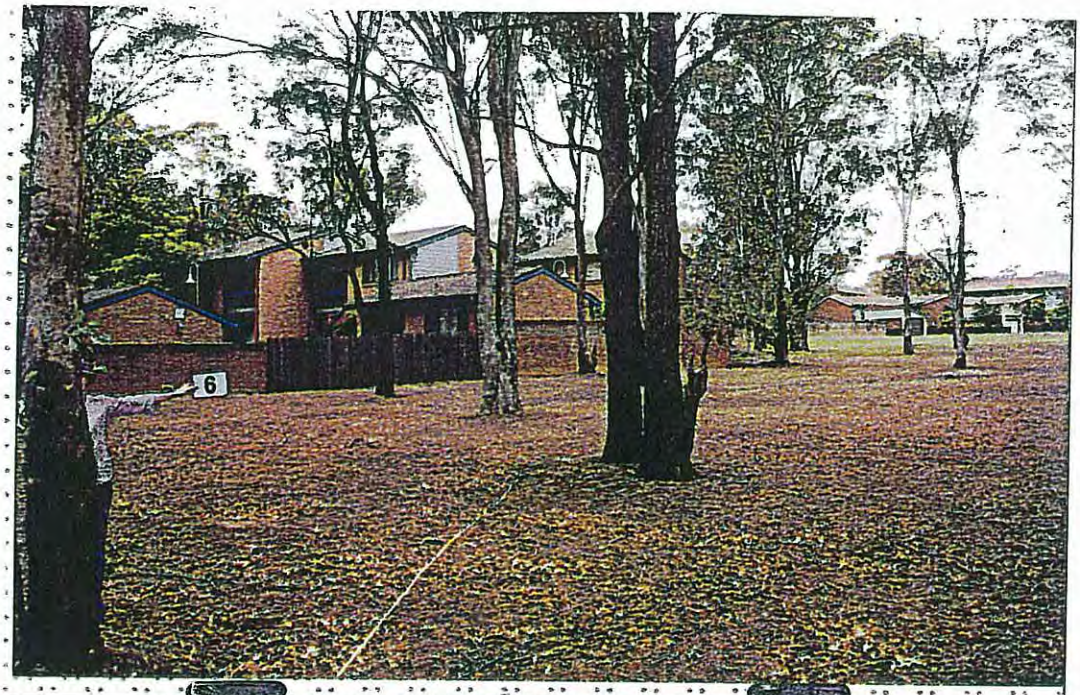
Spot location A
Olea europaea subsp. *africana*

Transect 4
Trees with mown understorey

Transect 5
Trees with mown understorey



Transect 6
Eucalyptus crebra



Transect 7
Trees with mown understorey

Appendix 3
Commonwealth listing advice for Cumberland Plain Woodlands – EP&BC Act 1999

ECOLOGICAL COMMUNITY RECOMMENDED FOR LISTING IN SCHEDULE 2 OF THE *ENDANGERED SPECIES PROTECTION ACT 1992*

Note: Certain confidential information and site specific references have been removed from the original document before publication on the internet.

Cumberland Plain Woodlands

Advice to the Minister for the Environment and Heritagefrom the Endangered Species Scientific Subcommittee (ESSS)on a proposal to add an ecological community to Schedule 2 of the*Endangered Species Protection Act 1992* (ESP Act)

Note: This advice replaces ESSS's original advice, dated June 1998, that this community be listed.

Generally accepted name of the ecological community

Cumberland Plain Woodlands. Scientists generally recognise the 'Cumberland Plain Woodlands' to represent those distinct groupings of woodlands dominated by trees of *Eucalyptus moluccana,* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum) and in some areas *Eucalyptus crebra* (Narrow-leaved Ironbark).

Summary of the nomination

The nomination of 'Cumberland Plain Woodlands' is for Schedule 2, ie, 'Ecological Communities that are endangered'. The nomination provided a summary of information about the ecological community and evidence about the conservation status of the ecological community type. This community type was once widespread in the Cumberland Plains region west of Sydney NSW but has been reduced to a few fragmented lands by human use of this land for farming, industry and housing. The nomination states that the remaining lands of this ecological community are threatened by the spread of the Sydney suburban areas.

Statement with regard to the Endangered Species Protection Regulations

This nomination has been assessed by officers of the Threatened Species and Communities Section, Biodiversity Group, Environment Australia. ESSS has been advised that the information supplied with the nomination meets all the requirements specified by regulation.

Description of the range and status of the ecological community

The Cumberland Plain Woodlands is the accepted name for the plant community that occurs on soils derived from shale on the Cumberland Plain.

The Cumberland Plain Woodlands ecological community is characteristically of woodland structure but may include both more open and more dense areas, and the canopy is dominated by species including one or more of the following: *Eucalyptus moluccana*, *Eucalyptus tereticornis*, *Eucalyptus crebra*, *Eucalyptus eugenioides* and *Eucalyptus maculata*. The understorey is generally grassy to herbaceous with patches of shrubs, or if disturbed, contains components of the indigenous native species sufficient to re-establish the characteristic native understorey. The Cumberland Plains Woodlands ecological community includes regrowth that is likely to achieve a near natural structure or is a seral stage towards that structure.

The following assemblage of grass, forb and sub-shrub species characterises the understorey of the Cumberland Plain Woodlands ecological community: *Cheilanthes sieberi*, *Aristida ramosa*, *Aristida vagans*, *Chrysopodium milleflorum*, *Chloris truncata*, *Chloris ventricosa*, *Commelina cyanea*, *Cyperus gracilis*, *Dianella revoluta*, *Dichelachne micrantha*, *Echinopogon caespitosus*, *Echinopogon ovatus*, *Entolasia marginata*, *Eragrostis leptostachya*, *Hypoxis hygrometrica*, *Lepidosperma laterale*, *Lomandra filiformis*, *Lomandra*

ultiflora, *Microlaena stipoides*, *Oplismenus aemulus*, *Panicum simile*, *Themeda australis*, *Tricoryne elatior*, *isperula conferta*, *Brunoniella australis*, *Dichondra repens*, *Glycine cladestina*, *Glycine tabacina*, *Goodenia ederacea*, *Hardenbergia violacea*, *Hibbertia diffusa*, *Hypericum gramineum*, *Lissanthe strigosa*, *Oxalis exilis*, *hyllanthus filicaulis*, *Pratia purpurascens*, *Solanum pungetium*, *Vernonia cinerea* and *Wahlenbergia gracilis*. ne characteristic taller shrub assemblage is: *Acacia decurrens*, *Acacia falcata*, *Acacia implexa*, *Acacia arramattensis*, *Bursaria spinosa*, *Daviesia ulicifolia*, *Dillwynia sieberi*, *Exocarpos cupressiformis*, *Indigofera istralis*, *Melaleuca decora* and *Eremophila debilis*. The following assemblage characterises the tree canopy: *ucalyptus crebra*, *Eucalyptus eugenioides*, *Eucalyptus fibrosa*, *Eucalyptus maculata*, *Eucalyptus moluccana* nd *Eucalyptus tereticornis*.

ot all species listed as characteristic of the assemblage occur in every single stand of the community. Also, ie total list of plant species that occurs in the community is much larger than the characteristic assemblage, 'th many species occurring in one or a few sites, or in very low abundance. A detailed description of the ological community is provided in Benson D. (1992). The natural vegetation of Penrith. *Cunninghamia* 2(4): 41-596.

ie distribution of Cumberland Plain Woodlands in the County of Cumberland in 1788 was approximately 07,000 hectares. Only 6% (6,420 hectares) of the original community remained in 1988 in the form of small agmented stands. Although some areas occur within conservation reserves, this is in itself not sufficient to isure the long-term survival of the community unless the factors threatening the integrity and survival of the mmunity are ameliorated.

reats to the community include clearance for agriculture, grazing, hobby and poultry farming, housing and ner developments, invasion by exotic plants and increased nutrient loads due to fertiliser run-off from ardens or farmland, dumped refuse or sewer discharge.

w judged by ESSS in regard to the ESP Act criteria

's the view of ESSS that the ecological community known as 'Cumberland Plain Woodlands' is subject to rrent and continuing threats likely to lead to extinction as demonstrated by the following two of the four iteria for an ecological community provided in the document 'Listing Endangered Ecological Communities der the *Endangered species Protection Act 1992*: Guidelines for Nomination and Assessment of Proposals':

marked decrease in geographic distribution (to 6% of the original community), and

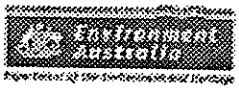
restricted geographic distribution such that the community could be lost rapidly by the action of a threatening ocess (such as clearance for farming, industry and housing).

SS judges that this ecological community meets the criteria for **endangered** under s6. (3) for the following asons:

- it is likely to become extinct in nature unless less the circumstances and factors affecting its abundance, survival or evolutionary development cease to operate.

commendation

umberland Plain Woodlands', should be listed under 'Schedule 2 Listed Ecological Communities' of the *dangered Species Protection Act 1992*.



Appendix 4
Final Determination for Cumberland Plain Woodland – TSC Act 1995

Final Determination

The Scientific Committee, established by the Threatened Species Conservation Act has made a Final Determination to list the Cumberland Plain Woodland as an ENDANGERED ECOLOGICAL COMMUNITY on Part 3 of Schedule 1 of the Act. Listing of Endangered Ecological Communities is provided for by Section 12 of the Act.

Any submissions received following advertisement of the Preliminary Determination have been considered by the Scientific Committee.

The Scientific Committee has found that:

1. The Cumberland Plain Woodland is the accepted name for the plant community that occurs on soils derived from shale on the Cumberland Plain.

2. The Cumberland Plain Woodland is characterised by the following assemblage of plant species:

Acacia decurrens	*Acacia falcata*	*Acacia implexa*
Acacia parramattensis	*Aristida ramosa*	*Aristida vagans*
Arthropodium milleflorum	*Asperula conferta*	*Brunoniella australis*
Bursaria spinosa	*Cheilanthes sieberi*	*Chloris truncata*
Chloris ventricosa	*Commelina cyanea*	*Cyperus gracilis*
Daviesia ulicifolia	*Dianella longifolia*	*Dianella revoluta*
Dichelachne micrantha	*Dichondra repens*	*Dillwynia sieberi*
Echinopogon caespitosus	*Echinopogon ovatus*	*Entolasia marginata*
Eragrostis leptostachya	*Eremophila debilis*	*Eucalyptus crebra*
Eucalyptus eugenioides	*Eucalyptus fibrosa*	*Eucalyptus maculata*
Eucalyptus moluccana	*Eucalyptus tereticornis*	*Exocarpos cupressiformis*
Glycine clandestina	*Glycine tabacina*	*Goodenia hederacea*
Hardenbergia violacea	*Hibbertia diffusa*	*Hypericum gramineum*
Hypoxis hygrometrica	*Indigofera australis*	*Lepidosperma laterale*
Lissanthe strigosa	*Lomandra filiformis*	*Lomandra multiflora*
Melaleuca decora	*Microlaena stipoides*	*Oplismenus aemulus*
Oxalis exilis	*Panicum simile*	*Phyllanthus filicaulis*
Pratia purpurascens	*Solanum pungetium*	*Themeda australis*
Tricoryne elatior	*Vernonia cinerea*	*Wahlenbergia gracilis.*

The total list of plant species which occur in the community is much larger, with many species occurring in one or a few sites, or in very low abundance. Not all species listed above occur in every single stand of the Community.

3. The Cumberland Plain Woodland sites are characteristically of woodland structure, but may include both more open and more dense areas, and the canopy is dominated by species including one or more of the following: *Eucalyptus moluccana, Eucalyptus tereticornis, Eucalyptus crebra, Eucalyptus eugenioides* and *Eucalyptus maculata.*

ESTABLISHED BY THE THREATENED SPECIES CONSERVATION ACT 1995

Contact Address: C/o PO Box 1967 HURSTVILLE NSW 2220 Telephone: (02) 9585 6940 Facsimile: (02) 9585 6606

4. The understorey is generally grassy to herbaceous with patches of shrubs, or if disturbed, contains components of indigenous native species sufficient to re-establish the characteristic native understorey.

5. The Cumberland Plain Woodland includes regrowth which is likely to achieve a near natural structure or a is seral stage towards that structure.

6. The Community has been reported as occurring in the local government areas of Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly.

The Scientific Committee noted that a more detailed description of the community is provided in:

* Benson (1992) The natural vegetation of the Penrith 1:100,000 map sheet. See particularly p. 556-7, p. 558, p. 566-575.

In additon, general information on the Cumberland Plain Woodland is also provided in:

* Benson, D. & Howell, J. 1990. 'Taken for Granted - The Bushland of Sydney and its Suburbs'. Kangaroo Press, Kenthurst
* Benson, D., Howell, J., and McDougall, L., 1996, Mountain Devil to Mangrove: a guide to the natural vegetation in the Hawkesbury-Nepean Catchment. Royal Botanic Gardens, Sydney

The Scientific Committee has found that:

7. The Community, as defined by the proposal, satisfies the definition of an Ecological Community under the Act, i.e. an assemblage of species occupying a particular area.

8. Only 6% of the original extent of the community remained in 1988 (Benson, D. & Howell, J. 1990 Proc. Ecol. Soc. Aust. 16, 115-127) in the form of small and fragmented stands. Although some areas occur within conservation reserves, this in itself is not sufficient to ensure the long term conservation of the Community unless the factors threatening the integrity and survival of the Community are ameliorated.

9. Threats to the survival of the community include clearance for agriculture, grazing, hobby and poultry farms, housing and other developments, invasion by exotic plants, and increased nutrient loads due to fertiliser run off from gardens and farmland, dumped refuse or sewer discharge.

10. In view of the substantial reduction in the area occupied by the Community, its fragmentation and the numerous threats to the integrity of the Community, the Scientific Committee is of the opinion that the Cumberland Plain Woodland is likely to become extinct in nature in New South Wales unless the factors threatening its survival cease to operate.

Dr Chris Dickman
Chairperson
Scientific Committee

Gazetted: 13/6/97

ESTABLISHED BY THE THREATENED SPECIES CONSERVATION ACT 1995

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Appendix 5
Noxious weeds for the Campbelltown LGA

Noxious weeds

Noxious Weeds in NSW

Home
Weeds page
Noxious weeds

NSW Agriculture

Campbelltown

The following weeds are declared noxious in the Campbelltown control area. The 'details' link on each listing provides further information on the legal requirements of the weed's listing and any variation in status within the local control area. A complete list of all weeds in all control areas is also available as a PDF document.

Common name	Scientific name	Category	
African boxthorn	*Lycium ferocissimum*	W2	details
Alligator weed	*Alternanthera philoxeroides*	W1	details
Balloon vine	*Cardiospermum grandiflorum*	W4c	details
Bathurst Noogoora Californian Cockle burrs	*Xanthium spp.*	W3	details
Black knapweed	*Centaurea nigra*	W1	details
Blackberry	*Rubus fruticosus (agg. spp.)*	W2	details
Bridal creeper	*Asparagus asparagoides*	W4c	details
Broomrape	*Orobanche spp.*	W1	details
Cabomba	*Cabomba spp.*	W4g	details
Castor oil plant	*Ricinus communis*	W2	details
Columbus grass	*Sorghum x almum*	W2	details
Dodder	*Cuscuta campestris*	W2	details
Giant Parramatta grass	*Sporobolus fertilis syn. Sporobolus indicus var. m*	W2	details
Gorse	*Ulex europaeus*	W2	details
Green cestrum	*Cestrum parqui*	W3	details
Harrisia cactus	*Harrisia spp.*	W4f	details
Hawkweed	*Hieracium spp.*	W1	details
Horsetail	*Equisetum spp.*	W1	details
Johnson grass	*Sorghum halepense*	W2	details
Karroo thorn	*Acacia karroo*	W1	details
Kochia	*Kochia scoparia*	W1	details
Lagarosiphon	*Lagarosiphon major*	W1	details
Lantana (Pink flowered)	*Lantana camara*	W2	details
Lantana (Red	*Lantana camara*	W2	details

flowered)			
Ludwigia	*Ludwigia peruviana*	W2	details
Madeira vine	*Anredera cordifolia*	W4c	details
Mexican feather grass	*Nassella tenuissima syn Stipa tenuissima*	W1	details
Miconia	*Miconia spp.*	W1	details
Morning glory	*Ipomea cairica*	W4c	details
Morning glory	*Ipomea indica*	W4c	details
Mother-of-millions	*Bryophyllum delagoense*	W3	details
Pampas grass	*Cortaderia spp.*	W2	details
Parthenium weed	*Parthenium hysterophorus*	W1	details
Paterson's curse,Vipers Italian bugloss	*Echium spp.*	W3	details
Pellitory	*Parietaria judaica*	W3	details
Prickly pears	*Opuntia spp.*	W4f	details
Privet - broadleaf	*Ligustrum lucidum*	W4b	details
Privet - narrowleaf	*Ligustrum sinense*	W4b	details
Rhus tree	*Toxicodendron succedaneum*	W2	details
Salvinia	*Salvinia molesta*	W2	details
Senegal tea plant	*Gymnocoronis spilanthoides*	W1	details
Siam weed	*Chromolaena odorata*	W1	details
Spiny burrgrass	*Cenchrus incertus*	W2	details
Spiny burrgrass	*Cenchrus longispinus*	W2	details
Spotted knapweed	*Centaurea maculosa*	W1	details
St John's wort	*Hypericum perforatum*	W2	details
Sweet briar	*Rosa rubiginosa*	W2	details
Water hyacinth	*Eichhornia crassipes*	W2	details
Water lettuce	*Pistia stratiotes*	W1	details
Willows	*Salix spp.*	W4g	details

For further information about weeds or weed control, visit the NSW Agriculture Weeds page or send an e-mail message to weeds@agric.nsw.gov.au.

The information contained in this web page is based on knowledge and understanding of Order(s) under the Noxious Weeds Act 1993 at the time of writing or at the time of last review . However, because:

- there may be changes to the Order(s) users are reminded of the need to ensure that information on which they rely is up to date, and
- some weed declarations of particular weeds have explanatory or qualifying notes and users should check the accuracy, completeness and currency of information by:
  - reading the Order(s),
  - inquiring with the appropriate officer of the Local Government Authority for the user's locality, and/or

- consulting with an independant advisor.

AIRDS BRADBURY RENEWAL PROJECT

ECOLOGICAL AND BUSHFIRE ASSESSMENT

APPENDIX 7

A3 size copies of Figures 1, 3, 4 and 5

April 2011

1:2500 Scale on A0

18/03/2011 110318.1

Landuse Plan

Airds Bradbury RENEWAL PROJECT

urbis | design out LOUD

Figure 2

FIGURE 2

Extent and distribution of Ecological Communities within the study area, and distribution of previous Koala records.

NOT FOR CONSTRUCTION

A1 SHEET

Rev	Amendment / Reason for Issue	Date	Drawing Completed by	Designed & Checked by	Verified by (X = Not verified)	Issue Authorised (✓)
A	FOR CLIENT REVIEW	10.09.09	JG	JG	X	

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Plan Scale 1:4000 @ A1

North

HughesTrueman

Project	AIRDS BRADBURY RENEWAL PROJECT
Client	LANDCOM
Architect/Project Manager	RESITECH
Drawing Title	STUDY AREA
Drawing No.	08P243 - SK04
Sheet	1 of 1
Rev	A

EXISTING EXTENT AND DISTRIBUTION OF ECOLOGICAL COMMUNITIES

CUMBERLAND PLAIN WOODLAND (CPW)

SHALE SANDSTONE TRANSITION FOREST (SSTF)

EXTENT AND DISTRIBUTION ECOLOGICAL COMMUNITIES

TO BE RETAINED
Approx: 3.19 ha CPW
3.73 ha SSTF

FOR MODIFICATION
Approx: 1.21 ha CPW
4.41 ha SSTF

Extent of native vegetation to be retained is directly relational to extent of habitat for native fauna, including Koalas.

DISCLAIMER:
Drawing subject to survey

14/03/2011 | 140311.1

DRAFT Vegetation Plan

Airds Bradbury RENEWAL PROJECT

urbis | design out LOUD

FIGURE 3

Ecological issues and areas of primary constraint within the proposed urban renewal lands at Airds and Bradbury.

NOT FOR CONSTRUCTION

Rev	Amendment / Reason for Issue	Date	Drawing Completed by	Designed & Checked by	Verified by (A = Not verified)	Issued Authorised (H)
A	FOR CLIENT REVIEW	13.03.09	JG	JG	H	

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100 50 0 100 200
Plan Scale 1:4000 @ A1

North

HughesTrueman

Project: AIRDS BRADBURY RENEWAL PROJECT

Drawing Title: STUDY AREA

Client: LANDCOM

Architect/Project Manager: RESITECH

Drawing No.: 08P243 - SK04

Sheet: 1 of 1

Rev: A

A1 SHEET