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Environment and Conservation (NSW)

The Vegetation of the Western Blue Mountains

including the Capertee, Coxs, Jenolan & Gurnang Areas

Volume 1: Technical Report

Hawkesbury-Nepean CMA
CATCHMENT MANAGEMENT AUTHORITY

The Vegetation of the Western Blue Mountains

(including the Capertee, Cox's, Jenolan and Gurnang Areas)

Volume 1: Technical Report (Final V1.1)

Project funded by the Hawkesbury – Nepean Catchment Management Authority

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Vegetation community profile photographs by Greg Steenbeeke unless otherwise noted. Feature cover photo by Greg Steenbeeke. All photographs are held by DEC. To obtain a copy please contact the Bioregional Data Group Coordinator, DEC Hurstville

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EXECUTIVE SUMMARY

This report describes the distribution and composition of the native vegetation communities for portions of the Oberon, Capertee and Lithgow areas within the Hawkesbury – Nepean catchment. It covers over 157 000 hectares of land. The project has been completed on behalf of the Catchment Management Authority with the aim to ensure that native vegetation mapping covers all unmapped areas outside of DEC managed lands in the catchment. The mapping provides a critical information resource for a wide range of support planning, management and monitoring for biodiversity objectives within the catchment. This project has sought to extend recently completed vegetation mapping work carried out across the South Coast and Cental Tablelands (Tindall *et al*. 2004) as part of the statewide vegetation mapping program. A small reserve adjoining the mapping area that covers the Jenolan Caves Trust Reserve has been mapped and described within this report, although it was separately funded by the Oberon office of the Parks and Wildlife Division.

A comprehensive field survey program was carried out to augment the information gathered in earlier mapping projects in the Warragamba Special Area, Western Blue Mountains National Park, Wollemi National Park and the South Coast and Central Tablelands. An additional 302 floristic survey sites were collected during this project, bringing the total number in the study area and surrounding 20 kilometre buffer to 1257 full floristic sites. All vascular plants were identified and vegetation, soil and disturbance information were recorded and entered into an electronic database. This data was used to classify vegetation communities using quantitative analytical techniques. Fifty-seven vegetation communities have been identified and each described in separate profiles. Each profile describes the composition and structure of the vegetation, example locations, disturbance levels present and includes a photograph that is considered to be representative of the community.

A detailed 1:25 000 scale map of the vegetation communities of the study area has been completed. Although primarily intended for use in developing Property Vegetation Plans under the NSW Native Vegetation Act 2003, this data can now be widely applied to a number of uses ranging from environmental reporting, fire management planning, conservation assessments and field operations. This map was constructed using detailed Aerial Photograph Interpretation (API) of nominal 1:25 000 scale colour photography (1998 – 2002) in conjunction with environmental data layers that describe the patterns in geology, elevation, rainfall and aspect. Digital data layers are available for use in ARCView GIS, which describe the distribution of vegetation communities as well as other landscape features such as exposed rock and cleared land. The derived mapping can now be used to display vegetation communities, vegetation structure, disturbance, amount of rock present, understorey type, canopy density and tree species present. A score for mapping reliability for each polygon is also provided. This fine scale information has been collected to assist with site based assessments.

This study identified and described 19 vegetation communities not previously described by recent regional mapping (Tindall *et al*. 2004). Many are located within the Capertee Valley, a distinctive and unique area for flora within the catchment. The project also identified and mapped four Endangered Ecological Communities (EECs) listed under the NSW Threatened Species Conservation Act (1995). These are the Genowlan Point *Allocasuarina nana* Heathland, Newnes Plateau Shrub Swamp, White Box –Yellow Box – Blakely's Red Gum Woodland and Montane Peatlands and Swamps. There are also two EECs listed under the Commonwealth Environment Protection and Biodiversity Conservation Act (1999). These EECs are the Grassy White Box Woodlands and the Temperate Highland Peat Swamps on Sandstone. Twenty-two plant species that are listed under the NSW Threatened Species Conservation Act (1995) were recorded during project surveys.

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1 INTRODUCTION

1.1 BACKGROUND

Native Vegetation Mapping is a fundamental information resource required for a myriad of uses associated with biodiversity and environment planning and catchment protection. While the primary attributes of such a resource inform vegetation management, it also provides direction on fauna habitat values, streamside protection and cultural heritage values.

The western Blue Mountains catchments of the Capertee, Wolgan – Cox's, Gurnang and Jenolan Valleys were mapped in four discontinuous areas. The first three of these areas were those areas of private lands, state forest and crown land tenures unmapped by the south coast regional vegetation mapping project of Tindall *et al.* (2004) as part of the Department of Infrastructure, Planning and Natural Resources (DIPNR) State-wide Native Vegetation Mapping Program. The Jenolan Valley was included in this project at the request of the Oberon office of the Parks and Wildlife Division of the Department of Environment and Conservation (DEC). The request was supported with additional funding. The total area of mapping undertaken in this project comes to slightly more than 157 000 hectares.

1.2 APPROACH

This project aims to:

- Develop a hierarchical classification system in order to describe vegetation patterns using systematic field data and quantitative analytical methods;
- Describe the floristic composition of the defined vegetation communities and their environmental characteristics;
- Examine floristic relationships between the vegetation communities found in the study area and those occurring within neighbouring landscapes having particular reference to Tindall *et al.* (2004);
- Delineate the extent of native vegetation cover using recent 1:25 000 scale aerial photography, including a coarse assessment of the intensity and type of disturbance present;
- Provide a map of the distribution of vegetation communities over the western parts of the Blue Mountains and therefore the upper reaches of the Hawkesbury – Nepean catchment.

Classification and mapping vegetation in NSW has been undertaken using a wide variety of methods and approaches (Benson 1999; FEWG 1997; Sivertsen & Smith 2001). Each method comes with strengths and weaknesses in terms of accuracy, efficiency and rigour (FEWG 1997). The adoption of systematic field methods provides an explicit and repeatable means of describing recurring patterns in floristic assemblages, hereafter termed vegetation communities. These methods afford the application of quantitative classification techniques that provide robust supporting data to vegetation community definition. In addition, comparison and assessment of broader regional vegetation patterns is more easily achieved and is less driven by subjective judgements.

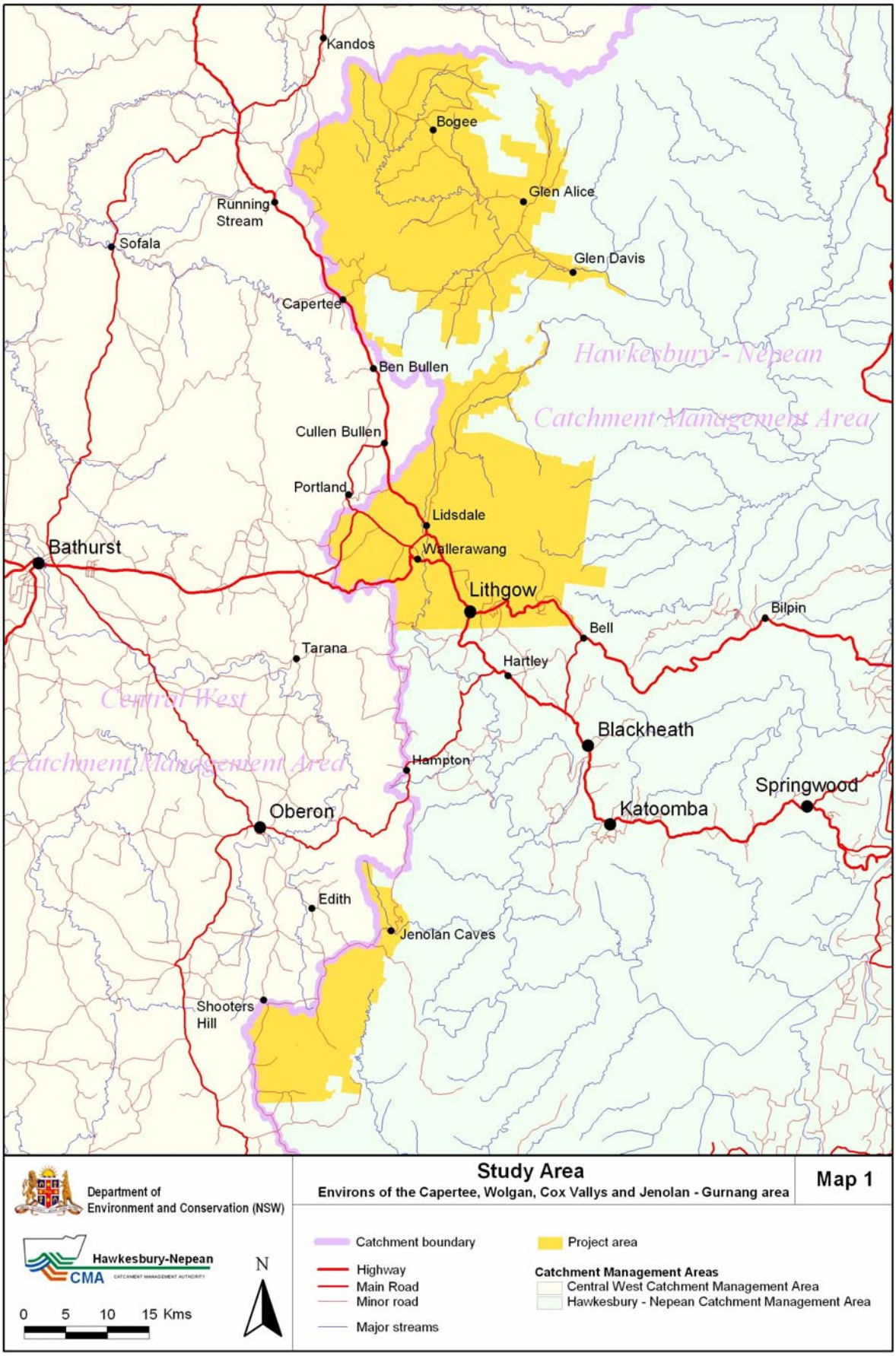
Mapping of vegetation communities defined by field data is always a process of interpolation. In this project, Aerial Photo Interpretation (API) and extensive field reconnaissance have been used to develop an understanding of the patterns in vegetation communities within the areas under consideration.

1.3 STUDY AREA

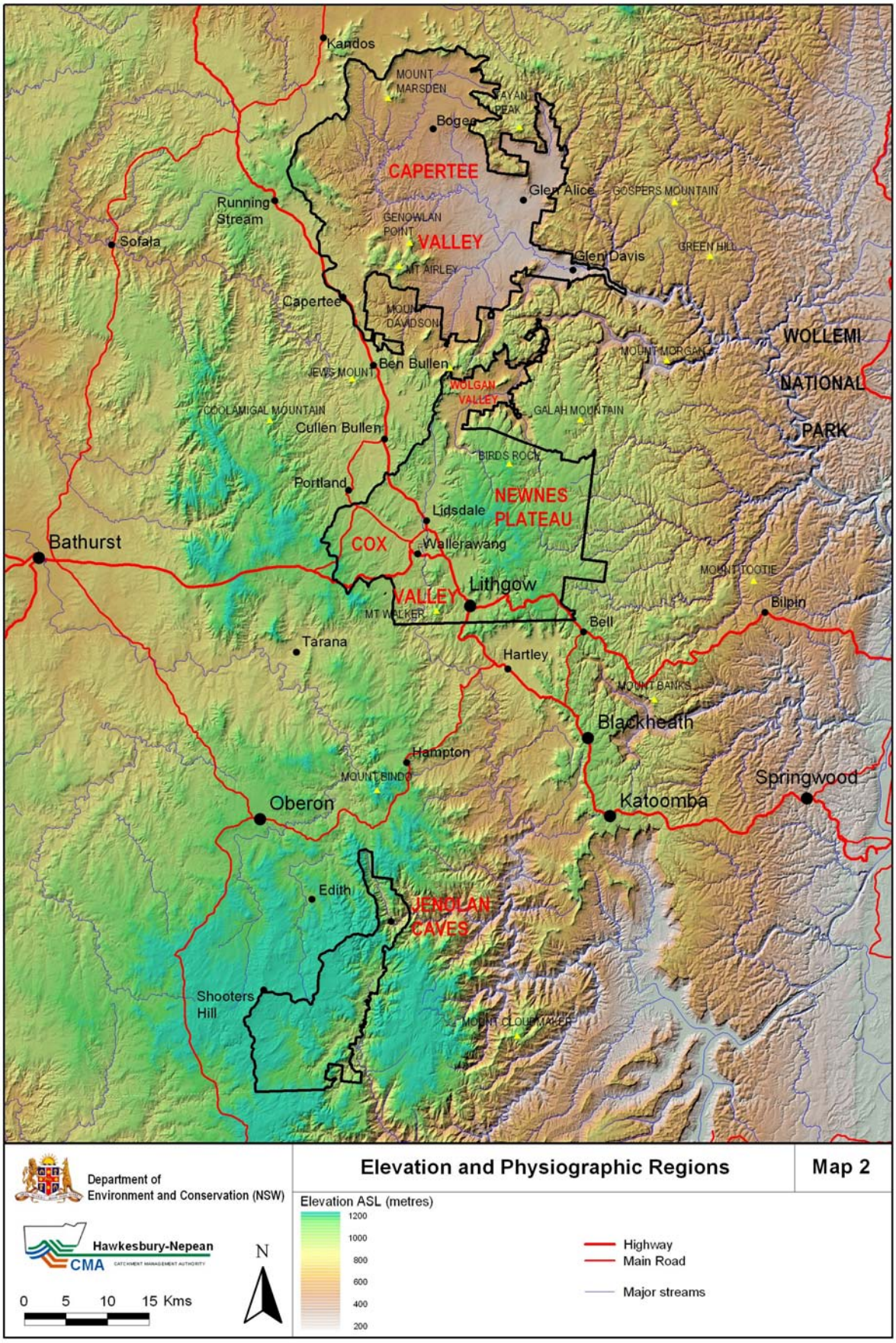
1.3.1 Location

The study area (Map 1) comprises four discontinuous areas that occur in the catchments of the Cox's and Wolgan, the Capertee, the Kowmung and Jenolan rivers in the western Blue Mountains. As the project was largely targeting areas outside existing mapping work the boundaries are map edges, reserve boundaries or the Great Dividing Range.

The individual mapping areas are separated by the Gardens of Stone and Wollemi National Parks in the north, and by the largely agricultural areas of the Megalong and Cox's valleys in the south. A very narrow separation between the Jenolan and Kowmung catchments is within the Kanangra-Boyd National Park, and was captured as part of the Jenolan Trust lands mapping undertaken concurrent to this project.



Map 1: Study Area



Map 2: Elevation and Physiographic Regions

There are a number of well-known physiographic landmarks and localities within the study area or near to the boundaries. A number of these are shown in Map 2. The town of Lithgow lies within the southern boundary of the Newnes (middle) mapping area, and Kandos immediately northwest of the Capertee. Jenolan Caves occurs in the northern isthmus of the southern mapping area. The Capertee Valley forms the basis for the northern mapping area, and the valley of the Kowmung river tributaries (The Hollanders and Tuglow rivers) forms the majority of the Gurnang (southern) mapping area. Shooters Hill, on the Oberon to Goulburn road, is the highest peak (1354 metres) and western boundary of the study area, although Mount Trickett near the top of the hill west of Jenolan Caves (and immediately between the two southern mapping areas) is slightly higher (1360 metres).

The areas of mapping are presented in Table 1.1. In total, they sum to about 60 percent of the area of a 1:100 000 scale map sheet.

TABLE 1.1: AREA OF EACH SURVEY MAPPING AREA

Mapping Area	Features	Area (ha)
Capertee (Northern)	Glen Davis, Mount Airly, Bogee, Kandos SF	74,296.27
Newnes (Middle)	Wolgan Valley, Newnes Plateau, Cox's Valley, Mount Walker	62,297.25
Gurnang (Southern)	Shooter's Hill, Gingkin, Tuglow Caves, Jaunter	17,591.94
Jenolan (Southern)	Jenolan Caves, Jenolan River	2,938.87
Total		**157,124.33**

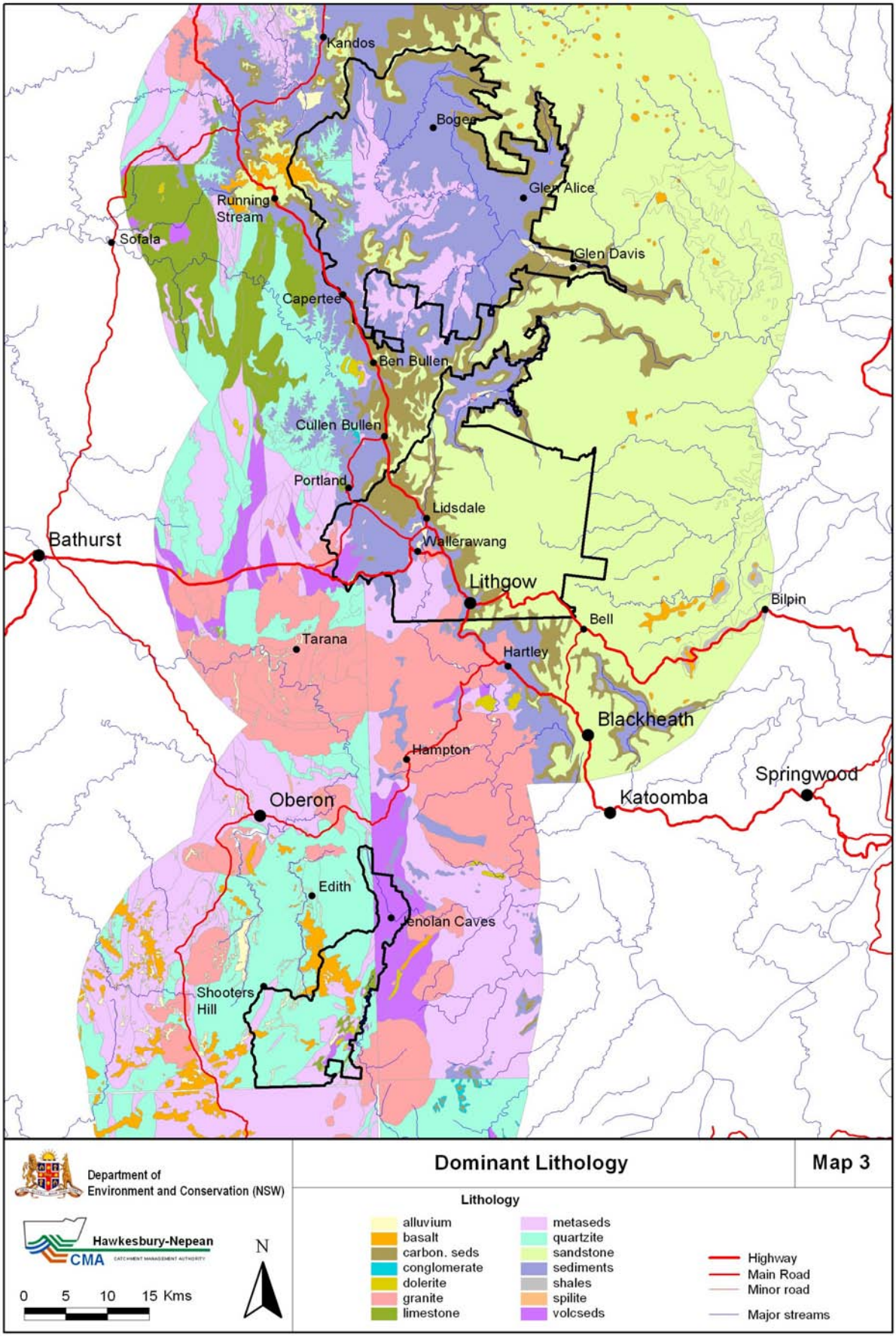
1.3.2 Environmental Setting

Geology

The generalised lithology of this area is presented in Map 3. Geologically, two distinctly different terrane types occur in the study areas, although they are arranged so that one overlies the other. The sandstone plateaux of the western Blue Mountains are formed of (predominantly) Triassic era Narrabeen sediments comprising massive sandstones with inter-bedded shale layers and lenses, tuffaceous shale and conglomerate (Mayne *et al.* 1974). The sandstones are often indurated with leached iron deposits that when weathered produce a distinctive appearance known as pagodas – owing largely to their similarity to the Asian architecture. This overlies the finer sediments of the Permian era coal deposits, and those in turn overlie the Megalong Conglomerate and Shoalhaven Beds – the basal units of the mostly flat-bedded Sydney Basin. The older terranes (parts of the Lachlan Fold Belt and Bathurst Batholith) are mostly altered as a result of regional metamorphism and are dipping, tilted and folded strata that in some cases are then intruded by granite plutons. The majority of the metamorphic material is felsic- or quartz-rich – either sandstone altered to quartzite or porphyritic rhyolites and lavas (Mayne *et al.* 1974), and is typically Ordovician, Silurian or Devonian in age. Large areas are also dominated by limestone and the calcite-rich shale called marl. The caves at Jenolan and Tuglow, and the economically important deposits at Excelsior (near Capertee) and near Kandos are representative of the major outcrops of massive limestone. The deposits that make up the southern limestone are Silurian in age, while those in the north are mapped as Ordovician (Brunker & Rose 1967).

Smaller areas of both granite and basalt occur in the study area. The majority of the granite occurs in the Newnes Mapping Area, with plutons exposed in the Lithgow, Wallerawang, Wolgan Valley and Mount Lambie areas, and a small area near Morong Deep in the extreme south-eastern corner of the Gurnang Mapping Area. Tertiary-age (mostly Eocene to Oligocene, but Miocene in the south) basalt, phonolite and trachyte overlies the older material in several locations in the Capertee Mapping Area and the Gingkin area near Tuglow (Brunker & Rose 1967, Mayne *et al.* 1974). The small bodies in the Capertee area mostly overlie the Narrabeen sediments although a small number of presumably intrusive bodies are found in older sediments in the Bogee area at the northern end of this mapping area. The largest extent of basic volcanic rock in the Capertee is found on the eastern extension of Cherry Tree Hill where it caps the plateau of Mount Vincent.

Basalt does not make a mapped appearance in the Newnes Mapping Area although there is some suggestion of the presence of basalt in small bodies on a number of the higher parts of the mapping area. In the Gurnang Mapping Area the basalt largely overlies the Ordovician age quartzite's, greywacke and slates of the Adaminaby group. Throughout the mapping areas much of the alkali (basalt and related) geology has suffered from clearing as the soils are often deeper than the surrounding areas and much more fertile, and the landform is more usually of a rolling pattern making the areas easily cleared and tended.



Map 3: Dominant Lithology

Apart from the narrow strips of Quaternary (Recent) alluvium that form along the main streams there are several more extensive areas of alluvium that have formed, in the lower parts of the Capertee, in the upper Cox's valley and upper Tuglow river. These areas tend to be flat lying and are dominated mostly by sandy alluvium. Typically these areas have been extensively cleared and support little native vegetation. Some areas of organic soils are formed at higher altitudes on parts of the Newnes Plateau and at Long Swamp in the headwaters of the Cox's River. Some areas on the Newnes Plateau have been identified as having aeolian dunes and have been prospected for silica.

Morphology

The study area comprises a combination of rugged and relatively inaccessible landscapes and rolling terrain that has been largely cleared for agriculture. The main geographic features of the Capertee and Newnes study areas are the extensive sandstone tablelands and the rivers and tributaries which dissect them. The tablelands are comprised of Narrabeen sediments deposited in the Triassic era (Bryan 1966). This includes the Newnes Plateau, the Ben Bullen Range and Western Wollemi as well as the mesas of Mount Airly and the extension out to Genowlan Point and the Great Dividing Range from Mount Vincent north across to Kandos and eastwards north of Bogee. The steep faces of the cliffs form along joint planes, and the weakening of the underlying sediments by weathering produces sizeable rockfalls and landslides resulting in a quartz-enriched talus slope below the cliffs.

The areas of metamorphic rock often produce steep, rocky slopes that are usually deeply dissected by the drainage. The finer-grained materials and the limestone are usually preferentially eroded, leaving steep-sided (but not usually sheer) ridges with much loose rock. This landscape characterises the southern (Gurnang – Jenolan) and the western Capertee mapping areas in particular.

The Narrabeen Sandstone produces an infertile sandy soil (DLWC 2002; Hamilton 1976; Hazelton & Tille 1990) which drains well, but has a shallow, sandy structure and low water-holding capacity (Kovac & Lawrie 1990). In areas of lower slope the admixing of organic matter improves the structure and water holding capacity. The soils that form over the Permian sediments below the escarpments are usually still very sandy in nature, with the sandstone talus weathering into the profile. This soil tends to be of intermediate nutrient status and the additional sand in the profile aids in drainage. The profile can be quite deep, with the accumulation of colluvium producing a deeper, if stony profile. The shale and siltstone material tend to occur in flatter locations, such as on footslopes or eroded ridges. A clay loam soil tends to develop in these areas, which is of slightly higher fertility with a better water holding capacity (DLWC 2002; Hamilton 1976; Hazelton & Tille 1990). Clay subsoil & duplex soils may form on slopes where shales are weathering (Kovac & Lawrie 1990; Dacre King pers. comm.).

Some areas on the sandstones are also suggestive of higher nutrient levels, and this may relate to obscure areas of basalt, or possibly areas from where the basalt has been relatively recently eroded. Some areas on the sandstone are also affected by interbedded layers of shale. The wet soils that form in these locations may support a 'hanging swamp' community on organic-rich clay soils.

The various metamorphic materials weather to produce soils of character similar to the array of rocks from which they are derived. Quartzite weathers to produce a shallow, rocky soil with low to moderate nutrient status and poor water holding capacity, often with cobbles and larger angular stones on the surface. The shales and interbedded volcanic rocks produce a soil of higher nutrient status that may be deep in places, but is usually stony. The water-holding capacity of the soils derived from the shales and volcanics is usually moderate (Kovac & Lawrie 1990). The limestone and marl produce a lime-enriched soil (usually a terra rossa) that often has loose rock on the surface and supports a clay soil. It has good water-holding capacity, but the steep slopes usually limit the accumulation of soil (Dacre King pers. comm.; Kovac & Lawrie 1990).

The soils over the volcanic and plutonic rocks are usually of low-moderate (granite) to moderate-high (basalt) nutrient status, and often of a clay or gritty clay texture. The soils vary in depth but on flatter slopes can become quite deep. Basalt soils tend to support a grassier community, and near Gingkin chocolate soils and krasnozem form over the basalts, while the granites tend to form podzols and sandy earths of low fertility and low to moderate water-holding capacity (Kovac & Lawrie 1990).

Elevation

There is a large elevation range within the study areas (Map 2). The lowest areas occur around the lower ends of the Capertee and Wolgan rivers, where the altitude drops to 233 metres above sea level (ASL) and 502 metres ASL respectively. The highest elevation within the study area is found on the peak of Shooters Hill, on the Great Divide, which is 1354 metres ASL, although several high peaks occur

throughout the area and much of the elevated plateau country in all mapping areas exceeds 1000 metres ASL. Each of the three mapping areas is different with regard to median elevations and terrain. Table 1.2 summarises the main elevation characters of all mapping areas.

TABLE 1.2. ELEVATION LIMITS AND AVERAGES FOR EACH MAPPING AREA

Mapping Area	Highest Point	Lowest Point	Elevation Statistics
Capertee (northern)	Mount Vincent (1111 metres) (Tayan Peak at 1154m is highest in the vicinity, but is excluded from the mapping area)	Capertee River below Glen Davis (233 metres)	Mean: 532 metres SD[1]: 171.3 metres
Newnes (middle)	Garlands Hill (1221 metres)	Wolgan River at Newnes (502 metres)	Mean: 983 metres SD: 129.0 metres
Gurnang (southern)	Shooters Hill (1354 metres)	Tuglow Hole Creek (860 metres)	Mean: 1165 metres SD: 83.8 metres
Jenolan	Unnamed peak west of Jenolan Caves (1324 metres)	Jenolan River (638 metres)	Mean: 1036 metres SD: 135.5 metres

[1]: SD: Standard deviation, the value above and below the mean within which 60 percent of all values occur.

Climate

The climate of the mapping region is variable, being mostly influenced by topography, including ruggedness, position and elevation. Map 4 illustrates the range in average annual rainfall across the study areas. The lower elevations of the Capertee Valley experience a warm and dry climate, as illustrated by Glen Davis having the lowest average rainfall values and highest average temperatures of the meteorological stations examined. The Lithgow data further support that the influence of topography in the regional climate is great, the position below the elevated plateau resulting in a decrease in rainfall values and slight increase in overall temperatures. The higher elevation tablelands and highland areas have both a cooler and wetter climate (NPWS 2003b; BOM 2005). The mean temperatures and annual rainfall summaries from the various weather stations within and nearest to the study areas are presented in Table 1.3 (BOM 2005).

TABLE 1.3: WEATHER STATION DATA FOR THE STUDY AREA

Station	Mean Temps (^{o}C)	Variations in Monthly Rainfall Means (mm)	Rainfall Extremes (mm) – Month and Day Maxima	Mean Annual Rainfall (mm)
Glen Davis (063031)	16.5 - 30.3 (Jan) 2.0 - 15.4 (June)	H – 72.7 (Feb) L – 36.8 (Sep)	Month - 226.6 (June) Day – 113.0 (Mar)	634.0
Gurnang (063033)	9.0 – 22.8 (Jan) -1.6 – 7.4 (Jun)	H – 93.9 (Jun) L – 69.2 (Mar)	M – 345.2 (May) D – 200.3 (Mar)	987.8
Sunny Corner (063079)	10.4 – 25.2 (Jan) -0.2 – 7.1 (Jun)	H – 90.8 (Jan) L – 62.7 (Apr)	M – 316.9 (Feb) D – 135.0 (Sep)	926.4
Jenolan SF (063037)	9.7 – 22.4 (Jan) -1.1 – 7.9 (Jun)	H – 124.9 (Jan) L – 76.5 (Sep)	M – 499.0 (Mar) D – 219.2 (Mar)	1158.4
Oberon (063293)	11.8 – 24.0 (Jan) 0.2 – 8.2 (Jun)	H – 81.3 (Jan) L – 50.2 (Apr)	M – 227.1 (Apr) D – 76.6 (Sep)	784.9
Newnes Forest (063062)	10.2 – 23.2 (Jan) -0.8 – 9.4 (Jun)	H – 121.0 (Jan) L – 67.9 (Sep)	M – 519.4 (Mar) D – 192.0 (Aug)	1071.9
Jenolan Caves (063036)	11.6 – 25.6 (Jan) 0.2 – 9.4 (Jun(	H – 93.5 (Jan) L – 66.3 (May)	M – 429.0 (Feb) D – 153.2 (Aug)	964.3
Lithgow (063224)	11.8 – 25.5 (Jan) 0.7 – 10.4 (Jun)	H – 92.9 (Jan) L – 63.7 (Apr)	M – 374.4 (Aug) D – 179.0 (Jun)	860.1
Lidsdale SF (063046)	11.4 – 24.6 (Jan) -0.3 – 9.5 (Jun)	H – 108.5 (Jan) L – 52.2 (Jul)	M – 361.9 (May) D – 148.6 (Apr)	877.4

Landuse and Tenure

The mapping area is thought to have been occupied by humans for at least 20 000 years before present (NPWS 1991). The project area boundaries represent part of the traditional home of the Dharuk and Gundangarra Aboriginal people (NPWS 1991). Evidence of indigenous use and occupation of the region includes artefacts in rock shelters, camp sites, axe grinding grooves, rock engravings, stone arrangements, burial sites and sites of spiritual significance (NPWS 2001a).

European occupation of the region commenced around the year 1814, after a way was found across the Carmarthen Hills (Blue Mountains) and through to the pasturelands astride and to the west of the Great Dividing Range (NPWS 2001a). Initially farming was mostly restricted to the richer alluvial soils in the Cox's Valley (NPWS 1991) and soon after in the Capertee Valley. One of the peaks to the northern end of the study area (Mount Marsden) commemorates that the Reverend Marsden had a large holding in the upper reaches of the Capertee Valley. Agricultural pursuits in the study areas were centred on extensive sheep and cattle grazing, although there are also limited areas of cropping (mainly in the lower parts of the Capertee Valley).

Logging has an extensive history in the area, and includes both softwood plantation and native hardwoods. Pine (mainly *Pinus radiata*) is grown in extensive plantations in the Newnes Plateau, around Shooters Hill and Jenolan (Jenolan and Gurnang State Forests) and west of Lithgow. Hardwood, mainly as natural timber but to some extent also in plantations, is sourced from the Newnes Plateau and the Ben Bullen area, Kandos SF and in the State Forests between Jenolan and Shooters Hill. Map 5 shows the arrangement of land holdings within the study area, including the location of State Forests and National Parks.

The area also has an extensive history of coal and shale mining (Mayne *et al.* 1974). The largest shale oil plants at Glen Davis and Newnes were served by a rail link that extended from Newnes Junction (near the current upper end of the Zig Zag Tourist railway) across the plateau and through the Glowworm Tunnel down to the town of Newnes. A pipeline to carry shale oil from the processing works at Glen Davis linked with the works at Newnes and the railhead. Production ceased in 1952 owing to the high cost and easier sources of supply for fuel oils (Mayne *et al.* 1974). Other areas with mining production were to be found near the village of Capertee, and works were constructed into Mount Airly to extract oil shale, and at Marrangaroo, where the oil shale yielded the best volumes of fuel oil (Mayne *et al.* 1974). The rim of the Capertee valley is identified as having a number of accessible oil shale deposits. Coal continues to be mined in the areas around Lithgow and Wallerawang, and apart from local electrical generation, coal is also transported to ports at Sydney and Port Kembla by rail. Other mining activities in the area include limestone (quarried at Excelsior, north of Capertee) and diamonds. The latter is mostly sourced from streambeds trapped beneath the tertiary basalts in the Mount Airly and Genowlan Point areas.

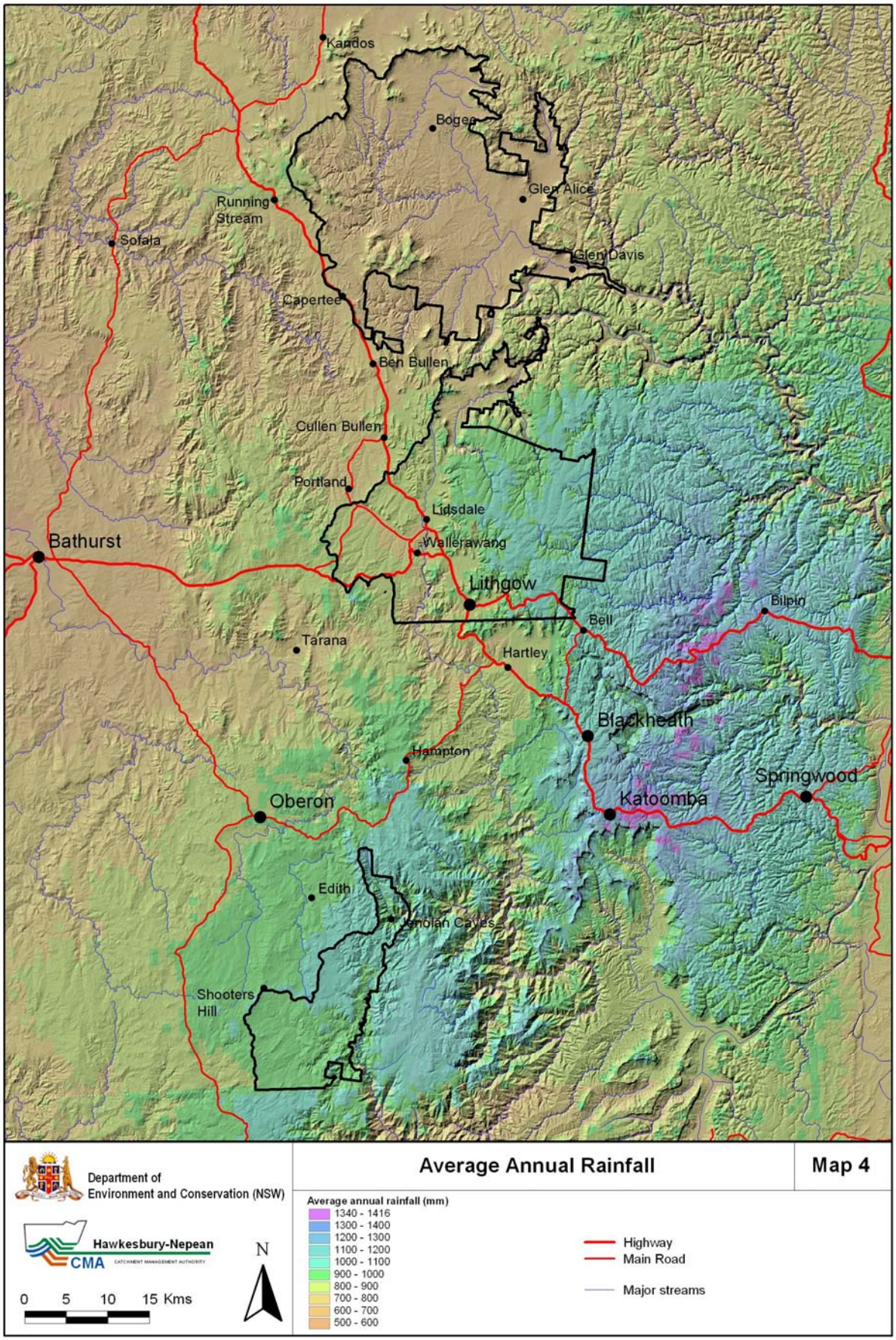
Tourism has become a major income earner for the region. Newnes and Jenolan State Forests are amongst the most frequently visited State Forests in NSW (www.forest.nsw.gov.au/recreation/survey/default.asp. Jenolan Caves is a well-known destination, and being within easy reach of Sydney is well frequented. The Capertee Valley is well known for the opportunities of farm stays and eco-tourism, while the Newnes Plateau is a relatively accessible location for off-road recreation. Military establishments at Lithgow have been responsible for small arms manufacture and testing.

Map 5 also shows that National Parks comprise a significant proportion of the landscape with extensive holdings in Wollemi, Kanangra Boyd, Gardens of Stone and Blue Mountains National Parks. Significant areas of leased and vacant Crown Lands remain in the Capertee hills.

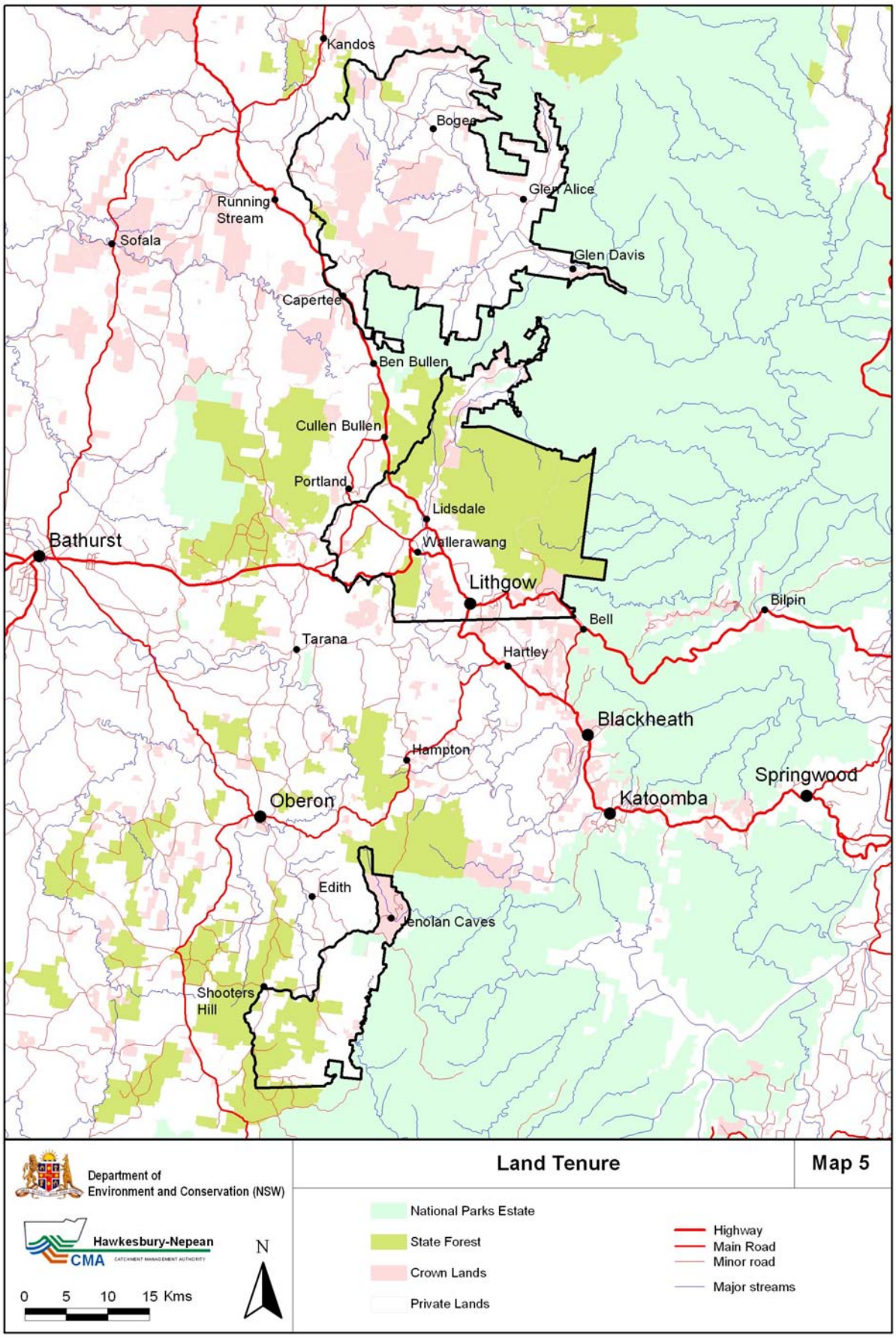
1.3.3 Regional Context

The mapping areas straddle the boundary (see Map 6) between the Sydney Basin and the South-eastern Highlands Bioregions as delineated in the Interim Biogeographic Regionalisation of Australia (IBRA) (Thackway & Cresswell 1995). The purpose of these regions is to establish a framework for conservation planning using broad landscape characteristics to highlight similar influences on flora and fauna. The interactions between climate, geology and broad vegetation are the primary attributes that have been used. The mapping areas include parts of the Central Coast (CC) and the Central Tablelands (CT) botanical regions (Anderson 1961), with the majority of the areas being in the CT. The CC region includes part of the lowest section of the Wolgan Valley, and the lowest parts of the Capertee valley and the elevated country south and east of Glen Alice.

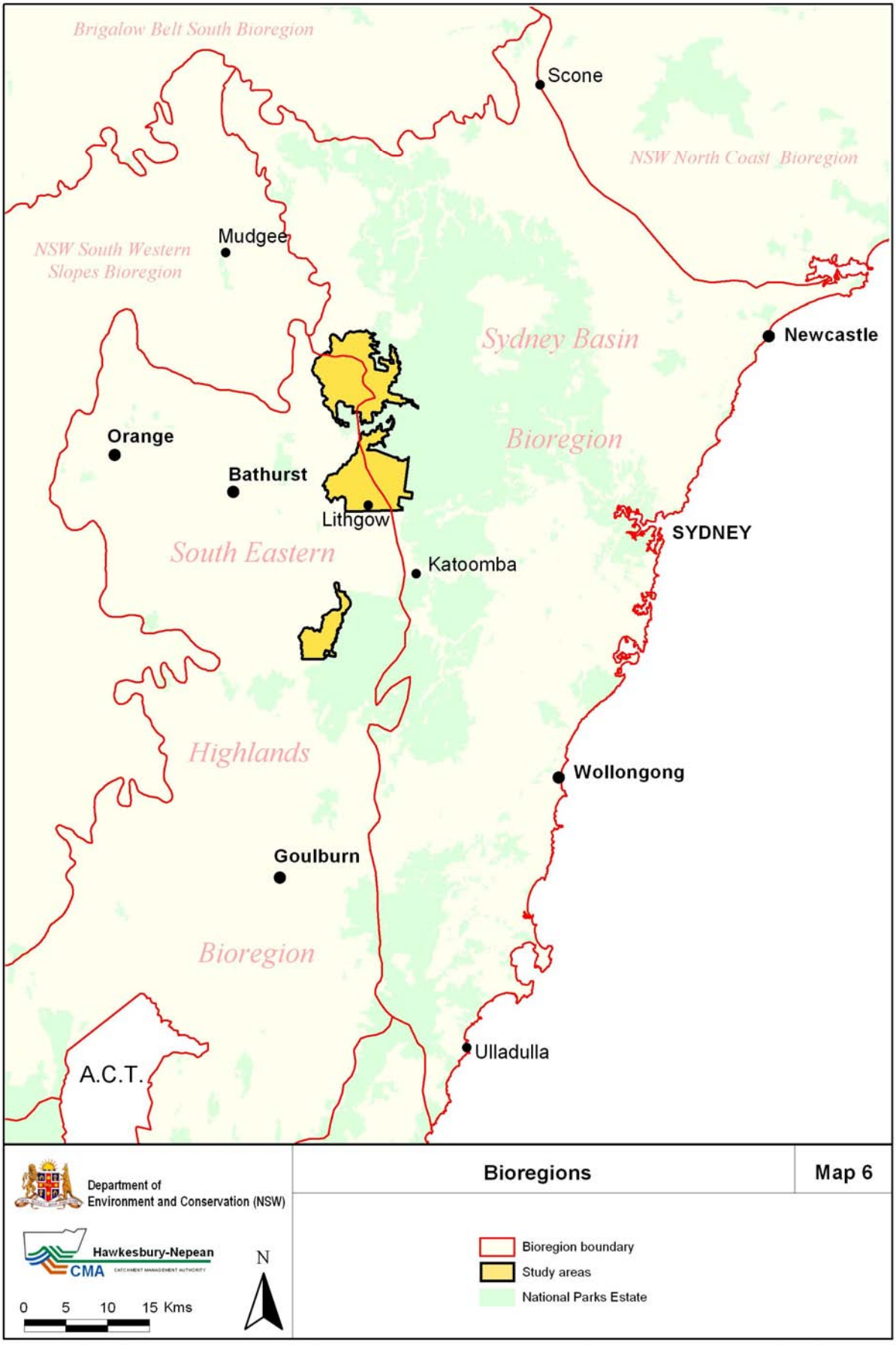
The four mapping areas all encompass very different areas. The Capertee is very similar to the western slopes in its landform and some of the species present. The Newnes Plateau is very typical of the upper Blue Mountains, while the valleys of the Cox's and of the Tuglow are typical of the elevated tableland areas. The Jenolan mapping area is representative of many of the escarpment forest communities.



Map 4: Average Annual Rainfall



Map 5: Land Tenure



Map 6: Bioregions

2 METHODS

2.1 REVIEW OF EXISTING INFORMATION

Prior to this study, regional scale vegetation mapping (1:100 000 scale) for the Burragorang (Fisher *et al.* 1995), Wallerawang (Benson & Keith 1990) and Katoomba (Keith & Benson 1988) and Oberon-Taralga (Fisher and Ryan 1994) mapsheets had been produced. The South Coast and Central Tablelands study (Tindall *et al.* 2004) had generated modelling and mapping for the mapsheets south and east of Lithgow. Earlier modelling work for the Southern Tablelands was completed by NPWS (2000). The descriptions of the vegetation patterns generated by these earlier studies are particularly useful, although the maps are not appropriate for use at 1:25 000 scale.

Some directed studies had been undertaken in particular areas that had been targeted for reserves and developments, or as part of either localised or more extensive assessments and regional studies. These include Gardens of Stone NP (EcoGIS 2002), Wollemi NP (Bell 1998) and the Warragamba Special Area (NPWS 2003). In addition, a number of post-graduate and master's level studies provided survey data for inclusion from the immediately surrounding areas.

2.2 EXISTING SITE DATA

Preliminary investigation of the study area suggested that 68 sites existed in the study area. These range in age from 1982 until just prior to the start of survey. However, since commencing survey, other sites were identified inside the mapping area boundaries raising total pre-existing numbers to 81. In addition, sites within the immediate vicinity of the study areas were also assessed, and altogether these come to a total of 955 sites within a 20 kilometre buffer of the study area boundaries.

Existing information has been carefully reviewed in order to collate datasets that have been collected using a comparable field survey method. There are a number of studies of relevance that have been undertaken within and surrounding the reserves. These vary in the type and methodology used to capture the information and thus their usefulness to this project. Only sites of direct use for this project were chosen (i.e. similar methodology and within close proximity to the reserves) for inclusion in analysis. Table 2.1 provides an overview of the studies of relevance to this project and the number of sites utilised from each. Surveys not included are shown to have zero sites utilised.

TABLE 2.1: EXISTING SURVEY DATA

Survey Name/Area	Sites Utilised	Total Sites Collected	Survey Method	Source
Airly Coal Mine	4	4	20 X 20 quadrat; 1-7 Braun-Blanquet	Long term vegetation monitoring, Lembit (pers. comm.)
All Sandstone	16	66	20 X 20 quadrat; 1-6 Braun-Blanquet	NPWS held data
All Wollemi	127	410	20 X 20 quadrat; 1-6 Braun-Blanquet	Bell (1998) Wollemi survey
Blue Mountains	3	15	20 X 20 quadrat; 1-6 Braun-Blanquet	Gellie & Jones, unpublished NPWS
Blue Mountains City Council	60	181	20 X 20 quadrat; 1-6 Braun-Blanquet	Steve Douglas, Blue Mountains City Council
Broad Headed Snake Potential Habitat Survey	3	25	20 X 20 quadrat; 1-7 Braun-Blanquet	Unpublished, data collected by Robert Payne (2001)
Clarence Coal Lease, swamp monitoring	4	4	20 X 20 quadrat; 1-7 Braun-Blanquet	Lembit (pers. comm.)
CRA Hunter	38	291	20 X 20 quadrat; 1-6 Braun-Blanquet	CRA LNE surveys in Hunter Region (Connolly).
EM631GLS	3	9	20x20 quadrat Separate cover / abundance and combined 1-6 BB	Steenbeeke (2005, unpublished)
Evans Crown Nature Reserve	16	16	20 X 20 quadrat; 1-6 Braun-Blanquet	Amanda Bryant, NPWS Bathurst.
Frappels Block, Sunny Corner SF	17	17	20 X 20 quadrat; 1-6 Braun-Blanquet	Amanda Bryant, NPWS Bathurst.
Gardens of Stone	81	81	20 X 20 quadrat; 1-6 Braun-Blanquet	Washington

Survey Name/Area	Sites Utilised	Total Sites Collected	Survey Method	Source
Hakea dohertyi study	58	123	20 X 20 quadrat; 1-6 Braun-Blanquet	Steenbeeke (1996)
Honours (Kowmung) Study	132	150	20 X 20 quadrat; 1-6 Braun-Blanquet	Steenbeeke (1990)
Ivanhoe North colliery rehabilitation survey	4	4	20 X 20 quadrat; 1-7 Braun-Blanquet	Lembit (pers. comm.)
Mount Werong	0	5	20 X 20 quadrat; Presence only	NPWS held data, Mjadwesch (unpubl.)
NP Southern CRA	40	40	20 X 20 quadrat; 1-7 Braun-Blanquet	NPWS southern CRA survey
Outside CRA records	1	109	20 X 20 quadrat; 1-6 Braun-Blanquet	NPWS held records
Priority 5 Management Area (P5MA)	58	800	20 X 20 quadrat; 1-7 Braun-Blanquet	Tindall *et al*. (2004)
Royal Botanic Gardens	32	51	20 X 20 quadrat; 1-6 Braun-Blanquet	Benson and Keith mapping of Katoomba (1988) and Wallerawang (1990)
Southern Zone CRA	179	250	20 X 20 quadrat; 1-7 Braun-Blanquet	NPWS held survey data, Beukers.
Steve Bell	42	43	20 X 20 quadrat; 1-6 Braun-Blanquet	NPWS held data (Bell unpubl.)
Taralga 1:25k sheet	3	42	20 X 20 quadrat; 1-6 Braun-Blanquet	NPWS held data (RBG)
Turon River NP	38	38	20 X 20 quadrat; 1-6 Braun-Blanquet	NPWS survey (Gellie unpubl.)
Warragamba Special Area	104	630	20 X 20 quadrat; 1-7 Braun-Blanquet	NPWS (2003b)
Winburndale Flora Reserve	36	36	20 X 20 quadrat; 1-6 Braun-Blanquet	NPWS survey (Bryant & Lembit)

2.3 SURVEY STRATIFICATION AND SITE SELECTION

Field surveys employed by a number of projects (e.g. NPWS 2003b) have used a stratified survey design to assist with the selection of survey sites. Stratification is a method used to reduce the landscape into more homogenous sampling units so that sampling effort can be spread across the variation in environments present. Generally strata are derived from data layers describing the geology, rainfall, elevation and aspect (NPWS 2003; Sivertsen & Smith 2001). Important considerations when developing a stratification include the following; how comprehensive the coverage is, the scale at which it is able to be used, what accuracy it shows to the expected boundaries, how well it 'dovetails' with adjacent areas when these have coverage, and whether it represents a character of the environment that is likely to have an effect upon vegetation distribution.

Initial layers considered for stratification in this project included the geology (a composite of lithology and age of the formation), aspect, altitude (in five separate elevation bands) and a simple woody – non-woody vegetation layer. However, closer examination of the distribution of geological units in the study area (particularly in the Newnes Mapping Area) revealed that the digitised mapping of the area was displaced by up to 800 metres to the northwest from its actual position. This was considered an unacceptable level of error, so this layer and those derived from it were rejected as possible stratification and mapping layers. The soil layer – one of the few layers that would yield information about the physical environment at a site – was also rejected as the coverage was inconsistent in source scale (1:250 000 and 1:100 000) and value. The mapping areas were covered by more than one classification system of soil landscape mapping and the variations were not able to be joined together easily and would have produced artificial boundaries to units along map boundaries (Kovac & Lawrie 1990; Kovac & Lawrie 1991; King 1993; King 1994).

Instead, stratification was developed from the detailed interpretation of landscape and vegetation features completed during this project. Each mapped polygon (Section 2.8) represents a homogenous combination of 'landscape' that includes geology, rock cover, dominant canopy species and understorey features. Feature codes, describing dominant canopy species and structural formations within unique substrates, were used as stratum. In this way a 1:25 000 scale map of substrate underpinned site selection across the range of climatic and altitudinal gradients present in the three distinct study areas.

Sample sites drawn from existing studies were reviewed against the stratification. Unsampled strata were highlighted in Arcview GIS against available access trails in order to identify potential sample points. Where strata fell across multiple land tenures, public lands were selected preferentially in order to

expedite travel and access times. Further priorities were allocated to localities where multiple strata could be sampled in close proximity to each other. Survey of State Forest tenures was completed under permit number 21924. Access to privately owned tenure followed verbal or written permission from landowner or manager.

2.4 FIELD SAMPLING

Field survey sought to sample areas that were typical of the surrounding vegetation and were as free of obvious disturbance as possible.

Sampling was carried out in teams of two people consisting of a botanist and an assistant. Species that could not be identified in the field were recorded to the nearest possible family or genus and tagged for later identification. Species that could not be identified accurately were taken or sent to the NSW Herbarium for identification.

Field sample sites were 0.04 hectares in area. The area was marked out using a 20 by 20 metre tape-bounded quadrat, although in some communities (such as riparian vegetation) a rectangular configuration (ten metres x 40 metres) of the plot was required. Location was determined from Garmin 12 Global Positioning System to as good and accuracy as possible (usually less than 10 metres) and this point located at a corner of the plot (usually the SW corner). Within each survey plot all vascular plant species were recorded and assigned a cover abundance score using a modified six-point Braun-Blanquet scale (Poore 1955) as shown in Table 2.2 below.

TABLE 2.2: COVER ABUNDANCE SCORES

Score	Cover Abundance
1	Rare, few individuals present (three or less) and Cover <5%;
2	Common and cover <5%;
3	Very Abundant and Cover nearing 5% OR Cover from 5% to <25%;
4	Cover from 25% to less than 50%;
5	Cover from 50% to less than 75%;
6	Cover 75% or more

Estimates were made of the height range, projected foliage cover and dominant species of each structural stratum recognisable at the site. Measurements of slope and aspect were taken. Notes were also made on geology, soil type and soil depth. The percentage of outcropping rock, loose surface rock (cobbles more than 40mm on the longest dimension), litter and bare soil were estimated. Evidence of recent fire, erosion, clearing, grazing, weed invasion or soil disturbance was also recorded. The location of the site was determined using a Garmin 12 global positioning system (GPS), using the AGD66 Datum. Elevations were read from the GPS, and where not considered accurate to within 10m were augmented by a value taken off 1:25 000 topographic maps. Digital photographs were also taken at each site and are attached to the floristic site data in a database operating in Microsoft Access.

2.5 SITE NOMENCLATURE

For the purpose of managing existing and new field data, each site was initially recorded in reverse date (YYMMDD) format with a dash and the site number for the day. For instance, 050422-4 would represent the fourth site collected for the day during the survey on the date April 22nd, 2005. This allowed sites to be entered into the database in a manner that placed the sites into chronological order when stored allowing rapid updates of data and assessment of survey effort. Following the completion of intensive survey, each survey plot was given an eight-digit alphanumerical survey identification number. A separate survey identification code was also given to all data to distinguish its source. Using this system enables the reader to understand basic geographical information about the survey site.

For example, site number EDT06M1M, which is the corrected version for the site listed above:

The first three letters “EDT” refer to an abbreviation of the first characters of the 1:25 000 topographic mapsheet name, in this case the Edith mapsheet, and are usually either the first three consonants or a vowel and two consonants where that sheet name begins with a vowel.

The fourth and fifth digits “06” refer to the site number by mapsheet, ie. the sixth site on this mapsheet. Previous studies using this numbering system were taken into account and numbering of the sites was amended accordingly to follow on from previous surveys.

The sixth character “M” refers to the geological substrate evidenced at the site in this case undifferentiated metamorphic materials. The geologies found within the study area were coded as follows:

A = Alluvium (primarily gravels and organic soils, although extensive sandy soils in some parts
B = Basalt
C = Conglomerate
D = Devonian Sediments (mostly quartzite with some porphyritic rhyolite)
G = Granite
L = Limestone and marl
M = Metamorphic materials
N = Narrabeen Sandstone
O = Ordovician metamorphics
P = Permian Sediments (coal, sandstone, siltstone and shale)
R = Rhyolite and porphyry
S = Silurian metamorphics
T = Talus materials, usually downslope of Narrabeen sediments cliff-faces
Z = Quartzite

The seventh character “1” refers to the generalised aspect observed at the site (east in this case) using the following categories:

1 = 67.6 – 112.5 or E
2 = 112.6 – 157.5 or SE
3 = 157.6 – 202.5 or S
4 = 202.6 – 247.5 or SW
5 = 247.6 – 292.5 or W
6 = 292.6 – 337.5 or NW
7 = 337.6 – 22.5 or N
8 = 22.6 – 67.5 or NE

The eighth character “M” is used to describe the morphology. Morphology coding is as follows:

C = Crest
U = Upper Slope
L = Lower Slope
M = Mid Slope
V = Open Depression
D = Closed Depression
S = Simple Slope
F = Flat
R = Ridge

2.6 DATABASE STORAGE

All the data collected during field survey was entered into a Microsoft® Access97 database. This database was developed by NPWS to facilitate the storage, entry and manipulation of systematic floristic survey data. Database entry windows are similar to the format used for field proformas to minimise data entry errors. All species recorded are coded using the Census of Australian Vascular Plant Species (CAPS). New species or subspecies, as identified by the Royal Botanic Gardens, not previously listed in the CAPS were assigned new codes to the master CAPS database. An extensive data validation procedure was undertaken to ensure that the data entered into the Access database matched what had been recorded in the field. Accuracy of survey site locations was also reviewed against original field sheets. Site photographs have been electronically attached to sites and stored with the database.

2.7 TAXONOMIC REVIEW

For this project, all nomenclature was reviewed and standardised across data sets for analysis. Synonyms were updated to reflect currently accepted revisions. Nomenclature was standardised to follow Harden (1990-1993 and revised editions 2000-2002). Recent taxonomic revisions have been identified using the Flora Online Website that has been developed by the Royal Botanic Gardens (2005). The principal outcomes of the taxonomic review are as follows:

- All exotic species were identified and excluded from the analysis dataset;
- The review highlighted species that were likely to have been incorrectly identified or incorrectly entered into the database. Original field sheets were reviewed to determine the status of these species and where data entry errors were detected, changes were made to the database. Where data entry errors were not detected, species were reviewed against existing literature. Where this indicated them to be outside their likely range, and no confirmation had been made, the record was deleted from the database;
- The review highlighted inconsistently collected records of species containing subspecies or varieties. In such cases, subspecies were either lumped to species level or were assigned to a single subspecies or variant if only one sub-specific entity is present in the study area;
- The review identified groups of species within which a regular inaccuracy in clear identification could be occurring as a result of season of survey or poor ability to distinguish in the field due to missing material or life stages;
- The review identified species hybrids that are not recognised formally in the literature. These were assigned to one or other of the parent species based on the predominance of either in surrounding environments; and
- The review highlighted flora species identified to genus level only. Samples identified to genus level only which were low in number and low in cover scores (less than five percent cover) were deleted from the analysis dataset. Where genus only samples were numerous, but could not be clearly assigned to a single species, they were left unchanged.

2.8 AERIAL PHOTO INTERPRETATION

2.8.1 Objectives

Extensive Aerial Photo Interpretation (API) was required to generate a complete spatial coverage of the Western Blue Mountains (Map 1) showing the distribution of landcover elements. The API component of this project has been used to meet several objectives. These are to:

- Quantify the extent of native vegetation cover across the mapping area;
- Guide and inform the mapping of vegetation communities derived from field data; and
- Provide an index of relative vegetation condition for all native vegetation cover.

2.8.2 Area Mapped and Photography Used

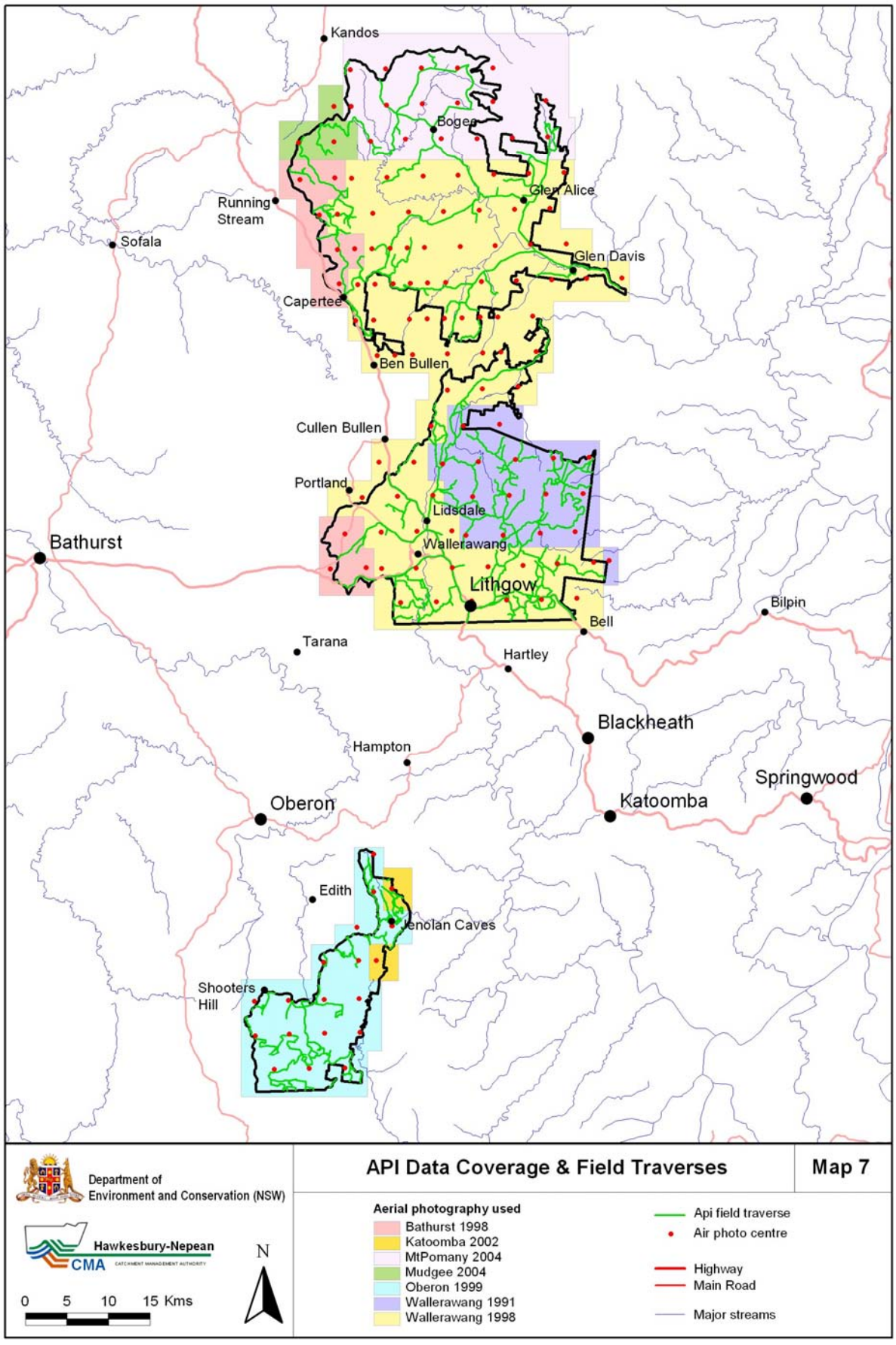
Air photo interpretation of the Western Blue Mountains was completed by a single interpreter using 1:25 000 scale aerial photos. Table 2.3 shows the aerial photographs used and Map 7 illustrates the extent of each coverage and the routes traversed.

2.8.3 Air Photo Interpretation and Landcover Classification

Air photo interpretation of landcover components as required by this project essentially involved reducing the variability in the landcover continuum according to a set of prescribed but open-ended criteria.

An API stratification of all landcover within the Western Blue Mountains was undertaken by applying the following attribute classes to each polygon. The Aerial Photos were interpreted to provide information on:

- Canopy Type
- Non-canopy Features
- Crown Cover
- Visible Rock
- API Confidence
- Understorey
- Disturbance Severity and Type of Disturbance



Map 7: API Data Coverage & Field Traverses

Attributes for each of these themes were encoded directly into ArcView GIS for each polygon. Approximately 27 000 polygons were mapped with an average patch size of 4.1 hectares. To ensure consistency in the interpretation of features across the Study Area, interpretation was tied to explicit mapping thresholds within each of the above themes.

The prescribed minimum patch size for mapping was one hectare. However, smaller patch sizes were mapped at the interpreter's discretion. Small areas considered significant enough to map included rock outcrops, rainforest patches, sedgeland and heathland. The mapping pathway is presented in Figure 2.2.

TABLE 2.3: AERIAL PHOTOGRAPHY INTERPRETED

Title	Run	Prints	Date
BATHURST	1	43-45	1998
BATHURST	2	17	1998
BATHURST	3	11-12	1998
BATHURST	4	22	1998
BATHURST	11	40	1998
BATHURST	12	44-46	1998
KATOOMBA	8	48	2002
KATOOMBA	9	29	2002
KATOOMBA	10	75	2002
MT POMANY	11	99-105	2004
MT POMANY	12	11-22	2004
MT POMANY	13	97-107	2004
MUDGEE	12	38	2004
MUDGEE	13	31-33	2004
OBERON	7	49	1999
OBERON	8	46	1999
OBERON	9	45-47	1999
OBERON	10	73-75	1999
OBERON	11	62-68	1999
OBERON	12	15-21	1999
OBERON	13	18-22	1999
WALLERAWANG	8	8-10	1991
WALLERAWANG	9	36-44	1991
WALLERAWANG	10	58-64	1991
WALLERAWANG	11	20-26	1991
WALLERAWANG	12	32	1991
WALLERAWANG	1	77-89	1998
WALLERAWANG	2	15-25	1998
WALLERAWANG	3	28-39	1998
WALLERAWANG	4	59-74	1998
WALLERAWANG	5	77-87	1998
WALLERAWANG	6	14-23	1998
WALLERAWANG	7	7-11	1998
WALLERAWANG	8	45	1998

Title	Run	Prints	Date
WALLERAWANG	9	53-55	1998
WALLERAWANG	10	77-81	1998
WALLERAWANG	11	19-23	1998
WALLERAWANG	12	3-15	1998
WALLERAWANG	13	37-47	1998

2.8.4 Feature Code

A primary requirement of the API was to map patterns of similar species composition within the upper stratum of native vegetation across the Study Area. The conventional process of delineating such areas by drawing a line of best fit between areas that are typically occupied by a species or group of species has the effect of reducing the variability of the landcover into "canopy types". Field traverses were used to relate photo patterns with canopy species composition.

A table of canopy types was compiled throughout the course of the project from field observation and reference to other data sources such as plot based floristic survey and previous vegetation mapping (See Table 2.1). All vegetation cover classified as having a crown cover greater than three percent (crown separation ratio of less than five (Walker & Hopkins 1984)) was allocated a canopy species code based on the dominant combinations of the upper stratum species.

Canopy types were described using a two level hierarchy. The first level in the hierarchy, Level 2, described a broad, recurring pattern in upper stratum species within a unique habitat. This unique habitat most often reflected similar geological substrates and topographic positions. The second level in the hierarchy, Level 3, was allocated for distinct patterns of species that could be identified within the broader patterns described in Level 2 and retained similar environmental characteristics.

A complete list of feature codes is provided in Appendix B.

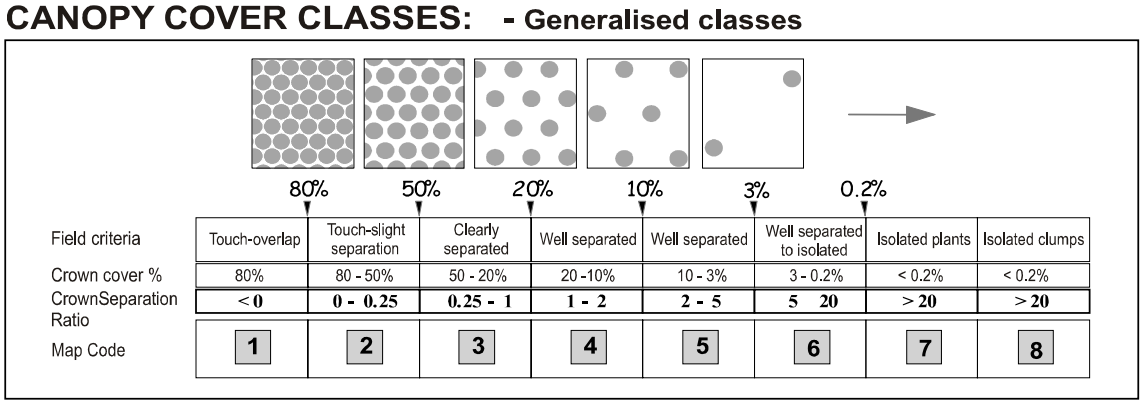
2.8.5 Non-canopy Features

Other landcover features mapped include non-vegetated and highly modified landcover such as infrastructure and cleared lands. A list of non-canopy features is provided in Appendix A.

2.8.6 Canopy Cover

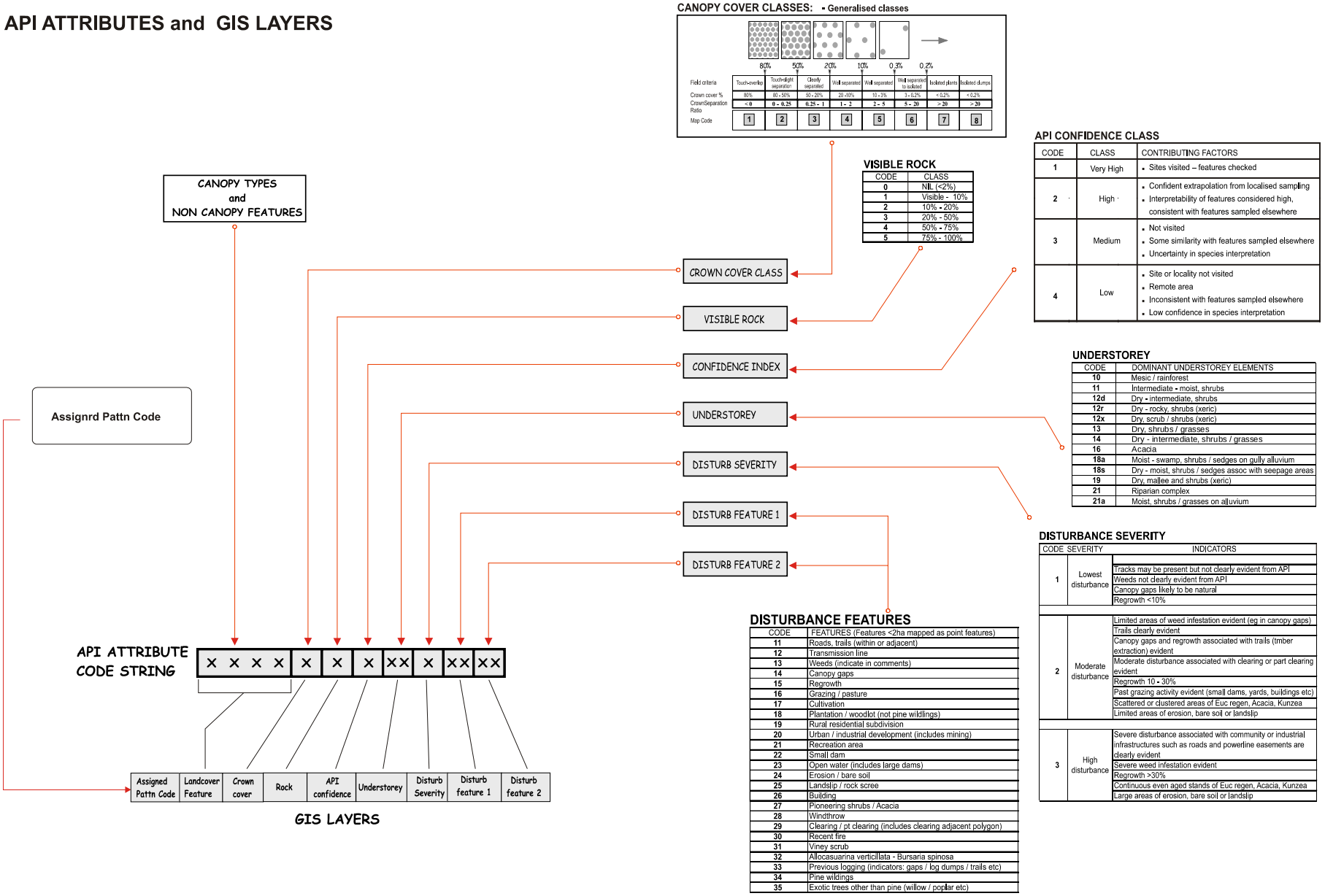
An eight-scale classification of Crown Separation Ratio was utilised as a relative measure of canopy cover (Figure 2.1).

Figure 2.1: Canopy Cover Classes



Adapted from Walker and Hopkins (1984)

Figure 2.2: API Mapping Pathway and Features



Closed, Mid dense to Sparse Vegetation Cover: canopy map codes 1-4

All vegetation cover that displays canopy integrity has been mapped. Canopy integrity has been defined as having a Crown Separation Ratio less than two (equivalent to canopy cover greater than ten percent). All vegetation cover falling within this class and with an area greater than one hectare has been mapped. This covers a range of sizes from large expanses of vegetation cover to remnant patches in cleared landscapes. They are attributed with a code describing the canopy species present, visible rock, the nature of the understorey, the severity and main types of disturbance present and an API confidence index.

Sparse Vegetation Cover: canopy map code 5

A regular feature of native vegetation cover in disturbed environments is the presence of scattered trees above an open or absent understorey, in a mosaic of cleared and remnant vegetation. Areas having a Crown Separation Ratio between two and five (equivalent to canopy cover between three and ten percent) are considered not to display canopy integrity. In view of this, attribution with a code describing the canopy species present and the nature of the understorey has been left to the discretion of the interpreter. Attributes indicating visible rock, the severity and main types of disturbance present and an API confidence index have been included.

Sparse to Very Sparse Vegetation Cover: canopy map codes 6-8

This includes obvious features such as man made structures, cleared paddocks, etc. Specific non-vegetative features attributed include landslides, rock outcrops and water bodies. Areas having a Crown Separation Ratio greater than five have not been attributed with a code describing the canopy species present and the nature of the understorey.

Visible Rock

Visible rock (Table 2.4) was interpreted for the purpose of providing information that may be of interest for further scientific survey investigation (herpetological, botanical) as well as for fire management and logistics (fuel and bushfire behaviour mapping, helicopter access points) etc.

TABLE 2.4: VISIBLE ROCK CLASSES

Code	Class
0	NIL
1	Visible – 10%
2	10 - 25%
3	25 – 50%
4	50 – 75%
5	75 – 100%

Interpretation Confidence

Four classes of interpreter mapping confidence were applied to each mapped polygon (Table 2.5). These classes enable users to understand the reliability of the mapping features.

TABLE 2.5: INTERPRETER CONFIDENCE CLASSES

Mapping Confidence Class	Confidence Assessment Criteria
1: Very High	• Sites visited, features checked
2: High	• Confident extrapolation from localised sampling • Interpretability of features considered high, consistent with features sampled elsewhere
3: Medium	• Not visited • Some similarity with features sample elsewhere • Uncertainty in species interpretation
4: Low	• Site or locality not visited • Remote area • Inconsistent with features sampled elsewhere • Low confidence in species interpretation

Understorey Classes

Understorey characteristics were interpreted where they were visible and grouped into a number of broad classes, as in Table 2.6. Understorey has been collected for a number of reasons. Firstly, it provides an additional layer of information that can be used to more accurately delineate vegetation community distribution. Secondly, it can be used to clarify habitat values for fauna. Understorey features are most reliably interpreted from mesic and sheltered forests, rocky open woodlands and through lower canopy cover vegetation formations. It is least reliable for understorey characteristics that lie between mesic and xeric.

TABLE 2.6: API UNDERSTOREY CODES

Understorey Code	Dominant Understorey Elements
10	• Mesic / Rainforest
11	• Intermediate – moist; Shrubs
12d	• Dry – intermediate; Shrubs
12r	• Dry; rocky, Shrubs / scrub (xeric)
12x	• Dry; Shrubs / scrub (xeric)
13	• Dry; Shrubs and grasses
14	• Dry – intermediate; Shrubs and grasses
16	• Acacia species
18a	• Moist – swamp; Shrubs and sedges on gully alluvium
18s	• Dry – moist; shrubs and sedges associated with seepage areas
19	• Dry; mallee and shrubs
21	• Riparian complex
21a	• Moist; shrubs and grasses on alluvium

Disturbance Severity Classes

All vegetation cover was assessed for disturbance. An initial code was applied to indicate the severity of disturbance based on a subjective assessment using a number of predefined indicators. This was a three-class system, including Low, Medium and High. The two most dominant types of disturbance were recorded in separate fields. Disturbance severity and type are displayed in Tables 2.7 and 2.8 respectively.

TABLE 2.7: DISTURBANCE SEVERITY CLASSES AND INDICATORS

Code	Severity	Indicators of Disturbance
1	Lowest Disturbance	• Tracks may be present but not clearly evident from API
		• Weeds not clearly evident from API
		• Canopy gaps likely to be natural
		• Regrowth <10%
2	Moderate Disturbance	• Limited areas of weed infestation evident (eg in canopy gaps)
		• Trails clearly evident
		• Canopy gaps and regrowth associated with trails (timber extraction) evident
		• Moderate disturbance associated with clearing or part clearing evident
		• Regrowth 10 - 30%
		• Past grazing activity evident (small dams, yards, buildings etc)
		• Scattered or clustered areas of Eucalypt regeneration, Acacia spp. • Kunzea spp. etc.
		• Limited areas of erosion, bare soil or landslip
3	High Disturbance	• Severe disturbance associated with community or industrial infrastructure • Such as roads and powerlines easements are clearly evident
		• Severe weed infestation evident
		• Regrowth >30%
		• Continuous even aged stands of Eucalypt regeneration, Acacia spp. • Kunzea spp. etc
		• Large areas of erosion, bare soil or landslip

TABLE 2.8: DISTURBANCE FEATURE TYPES

Disturbance Code	Disturbance Feature Type
11	• Roads, Trails (within or adjacent polygon)
12	• Transmission Line
13	• Weeds
14	• Canopy Gaps
15	• Regrowth
16	• Grazing / Pasture
17	• Cultivation
18	• Plantation / Woodlot (not pine wildlings)
19	• Rural Residential Subdivision
20	• Urban / Industrial Development (includes mining areas)
21	• Recreation Area
22	• Small Dam
23	• Open Water
24	• Erosion / Bare Soil
25	• Landslip
26	• Building
27	• Pioneering shrubs / Acacia
28	• Windthrow
29	• Clearing / Pt clearing
30	• Recent fire
31	• Viney Scrub
32	• Allocasuarina verticillata / Bursaria spinosa
33	• Pine wildlings
34	• Exotic trees other than pine (willow / poplar etc)

2.9 DIGITAL DATA CAPTURE AND MAP COMPILATION

The line work from the Aerial Photo Interpretation was completed on transparent overlays and delineated on every second photo frame.

The transfer of line work to a GIS format used a scanning and photogrammetric rectification process for each annotated photo. Ground control points were established using topographic maps and a 1:25 000 series of digital orthographic photos. These control points were used to rectify (the adjustment used to compensate for distortion due to change in elevation) and geo-reference (reference the spatial location by using the locations of known features) each photograph. Following this process, the raster data was converted to vectors, cleaned, and in turn converted to polygons.

A digital data layer supporting topology was cleaned and built in the ArcInfo GIS package. Polygons have been labelled with the attributes identified during interpretation process as per feature code table (Appendix A) and Tables described above.

Vegetation Pattern Code (Formation, Sub-formation, Feature);

- Crown Cover;
- Structural Formation;
- Visible Rock;
- API Confidence Class;
- Understorey;
- Disturbance Severity and Disturbance Feature (two fields).

2.10 VEGETATION CLASSIFICATION

2.10.1 Existing Vegetation Classification in the Hawkesbury – Nepean Catchment

Multiple vegetation classification systems have been applied to the native vegetation cover of the Hawkesbury – Nepean catchment (RBG 1:100 000 series) or in part NPWS (2000; 2002; 2003), Bell (1998), Tozer (2003). The scale of both the classifications of the vegetation as well as the derived map products is highly variable such that no single system can be applied to the whole region. This arises

because there is a wide variety of different uses for vegetation maps ranging from site based planning associated with urban development and clearing applications through to regional planning and fire management. Detailed delineation of vegetation communities is used to highlight endangered ecological communities and is a requirement of fine-scale mapping used by councils and land managers (e.g. ESP 2001; NPWS 2002; Bell 2002) while estimates of clearing and regional vegetation patterns are sought by regional conservation planning projects (Thomas *et.al*. 2000; Tindall *et al.* 2004).

The recently completed vegetation classification of the South Coast Priority Five Mapping Area (P5MA) (Tindall *et al.* 2004) provides the most complete single-source coverage of the broad vegetation communities in the southern Hawkesbury – Nepean catchment. However, the northern catchment includes large areas of reserved lands (Wollemi, Blue Mountains and Yengo National Parks) for which there is more detailed vegetation classification though the mapping remains coarse Bell (1998) and (Bell *et al.* 1993). By contrast local council mapping adjoining the study area is detailed in both classification and mapping (ESP 2001).

2.10.2 Relationships between Vegetation Community Classifications

In order to assess the floristic relationships between vegetation classifications used in several overlapping and/or adjoining regions, all available site data within a 20 kilometre radius of the study area was included in the analysis. In this way, the allocation of sample sites to vegetation communities described by other studies (Tindall *et al.* 2004; Bell 2004; ESP 2001) could be tracked in any new analysis. Further the relationships between the addition of new sites collected by this project and these existing sites could be assessed in the same way. In all, some 1257 data points were analysed. 466 sites occurred within areas mapped as part of this project, including the Jenolan Caves Trust Reserve.

2.10.3 Analysis of Data

All data was compiled and a full list of all species recorded was examined to standardise taxonomy across the various studies. In most cases the taxa below species level (varieties and subspecies mainly) were not recorded consistently (even within surveys). Therefore all taxa below species level were collapsed upwards unless they could be shown to be reliable. Species considered unlikely to be in the area were also examined for validity, and where possible site records were examined to determine either to accept as recorded, or rejects the entry as a data error. Species that had been segregated as part of a taxonomic review within the last 20 years were collapsed under the species in the broad sense (to remove errors induced by date of sampling). Where a group of species shows poor discernability in the field these were also collapsed under a single taxon and it treated in the broadest sense.

Analysis of all data from all 1257 sites was undertaken using the analyses in the PATN suite (Belbin 1994). A number of different analyses were run in an effort to ascertain the relationships between the spatial data layer and the floristic sites. Two separate sets of analyses were conducted, and initial map construction was based on the first and confirmed with the second. The first set of runs was conducted on data containing species data as extracted from the Vegetation Survey Database, with genus-only and single occurrence species within the dataset. Masking for all species of less than two sites occurrence was applied to the dataset using the appropriate option in PATN and analyses run in accordance with the procedures outlined below. The second set of analyses were conducted using the complete data set with single-occurrence taxa and those recorded only to genus level physically removed prior to analysis.

Analysis of the data was undertaken using three different approaches. An initial non-hierarchical clustering method (ALOC) using the kulczinski coefficient was applied to the data set, using five seeds and a maximum of 100 groups with 50 iterations. In the first analysis this produced 98 groups, in the second it generated 99 groups. As the method starts with randomly chosen seeds the groups generated in one run will not necessarily be labelled the same in subsequent runs, although in most cases sites will end up in similarly-composed groups following each run.

Secondly, an association matrix displaying dissimilarity scores between all pairs of sites was produced using the ASO module in PATN. An unweighted pair group arithmetic averaging (UPGMA) clustering strategy was applied to the matrix to derive a hierarchical classification from the bottom up (FUSE) and a similar approach from the top down using Polythetic Divisive clustering (PDIV). The default beta value of –0.1 was used on all analyses, and a total of 100 groups was requested from the analyses.

A dendrogram was produced to display the hierarchical relationships between both individual sites and groups of sites from each of the three different analyses. Two sites in vegetation sampling are rarely

identical given the natural continuum of vegetation patterns in the landscape. The question facing the analyst is to what degree are differences worthy of justifying unique groups of sites. These decisions are based on field observations and experience with similar vegetation. This interpretation results in either a broader or finer classification depending upon the aims and limitations of project.

Groups of sites were examined using the species that characterise the group, the structural features such as height and tree cover, along with physical characteristics such as geology, topographic position and aspect. These groups were matched to the spatial layer and communities allocated to groups of polygons based on similarity of coding strings and the frequency and similarity of floristic sites located in each polygon class.

2.11 DESCRIPTION OF VEGETATION COMMUNITIES

Vegetation communities have been described in detail using a number of features. Firstly, combinations of sites defining unique groups in the cluster analysis were used to identify the characteristic flora species of that group. These species are presented as a summary for each community in the profiles found in Volume Two. These are known as Map Units and describe the location, dominant or characteristic species (generally tree species), broad understorey description and structure. Each Map Unit is given a label to describe the vegetation present. This label is generally found only in this study in order to differentiate it from any other study unless: (a) sites used to describe a community have been used in an adjoining study that replicates the methods used here (e.g. NPWS 2003) or (b) a community defined in this study was based solely on sites collected in other studies (e.g. Tindall *et al.* 2004)

Each profile includes a brief summary of key identifying features. These include commonly occurring plant species and habitat characteristics. Example locations are also given, as is a sample photograph to guide in recognition of the community. The proportion of each disturbance class (percent) found within the mapped vegetation community is also presented along with figures highlighting the total extant area of the community within the study area. Data describing the vegetation structure (height and vegetation cover) has been generated from field sample points.

Each profile includes a list of diagnostic species. This species list is derived from the field site data and can be used to help define the floristic composition of a community in relation to all others present in the study area. A concept known as 'fidelity', developed by Keith and Bedward (1999) based on Westhoff and van der Maarel (1978) provides a systematic method for identifying 'diagnostic' or 'characteristic' species within an assemblage. This approach recognises that within given vegetation community a species may be conspicuous by the frequency and abundance with which it has been recorded. However, in other communities the same species may only occur sparsely, at low abundance or not at all. Patterns may be revealed by analysing the performance of each individual species found within each community. Table 2.9 describes the criteria used to define positive, negative, uninformative and constant species. Positive species are recorded more frequently within a community and/or at a higher median cover abundance than in all other vegetation communities. Positive species also include those that are only recorded within the target community irrespective of their frequency of detection or abundance. A species that is present in all other communities but is less common or abundant or not present at all in the target community is defined as a negative diagnostic species. A constant species is one that occurs consistently within many communities. Uninformative are those that are recorded at lower abundance and less frequently across all communities. The profile lists all species classified as positive, negative and constant. Some uninformative species have been included in the species list to aid field identification.

TABLE 2.9: DEFINITIONS OF DIAGNOSTIC SPECIES

		Occurrence of Species in Residual Map Units		
		Frequency>=35% AND C/A>=2	Frequency<35% OR C/A<2	Frequency=0
Occurrence of Species within Target Map Unit	Frequency>=35% AND C/A>=2	Constant	Positive Diagnostic	Positive Diagnostic
	Frequency<35% OR C/A<2	Negative Diagnostic	Uninformative	Positive Diagnostic
	Frequency=0	Negative Diagnostic	Uninformative	-

C/A = Cover Abundance

2.12 MAPPING VEGETATION COMMUNITIES

The mapping of vegetation communities integrated patterns in canopy and understorey from aerial photo interpretation with soil and geology mapping. Soil and geological influences are included within the aerial photograph coding as each code is structured hierarchically underneath major landscape and geological feature.

Allocation of a vegetation community to a mapped feature code was achieved using the following steps. Firstly, a number of vegetation communities appear as highly contrasting patterns on aerial photographs. These include swamps, rainforest, heaths and River Oak forests. These communities can be mapped with a high degree of reliability and correlate strongly with classified site data.

Secondly, eucalypt dominated vegetation codes were intersected with sample data. Feature codes that achieved 100 percent agreement in samples describing a single vegetation community in the analyses were allocated to that community. Feature codes that did not achieve complete agreement between sample point located within it were assessed for spatial accuracy. Sites that reached agreement within a 40 metre tolerance of the polygon boundary were subsequently allocated to the vegetation community. Sites that continued to indicate an alternative community to that described by the API feature code were investigated. Individual polygons were assessed against the mapping reliability code and, where low, were recorded to that suggested by the sample point. Feature codes that retained mixed sample allocations were allocated to the vegetated community suggested by the majority of samples and the composition of both site and polygon data strings. A small number of codes were not sampled and these were allocated to a vegetation community based on field traverses or were amalgamated with adjoining communities based on similar geological, structural and floristic attributes.

Vegetation communities defined by sites that were all located outside of the study area were excluded where they described vegetation communities found in environmental domains not present in the study area.

3 RESULTS

3.1 SURVEY SITES

Field sampling was conducted from December 2004 until October 2005. A total of 302 full floristic survey sites were sampled during this period. These sites augmented the existing 955 sites that were extracted from previous studies (Section 2.2). The total number of sites utilised in analysis reached 1257, of which 346 occurred within the study area. This equates to a sampling density of one site per 454 hectares, slightly better than the one site per 500 hectares nominated in the project brief. These sites are displayed on Map 8.

3.1.1 Sampling Performance

Field survey sites sampled 160 of the 187 (85 percent) native vegetation feature codes mapped from aerial photographic interpretation and associated fieldwork. The apportioning of sampling effort between the feature codes is shown in Appendix B. Unsampled feature codes comprise less than 0.5 percent of the remaining vegetation cover. Appendix B includes sites from pre-existing surveys.

3.2 AERIAL PHOTOGRAPH INTERPRETATION

Aerial Photo Interpretation of vegetation patterns has been completed over the study area. In total over 203 different vegetation and landscape features have been mapped. These include vegetation patterns as well as landscape features such as rock outcrop and man made infrastructure such as powerline easements and transport corridors.

3.2.1 Spatial Accuracy

The spatial accuracy of the API data layer is based on a detailed comparison of ten percent of polygons against linear and high contrast landscape features obvious in orthorectified 1:40 000 digital air photo images and orthorectified digital images of the 1:25 000 topographic mapsheets.

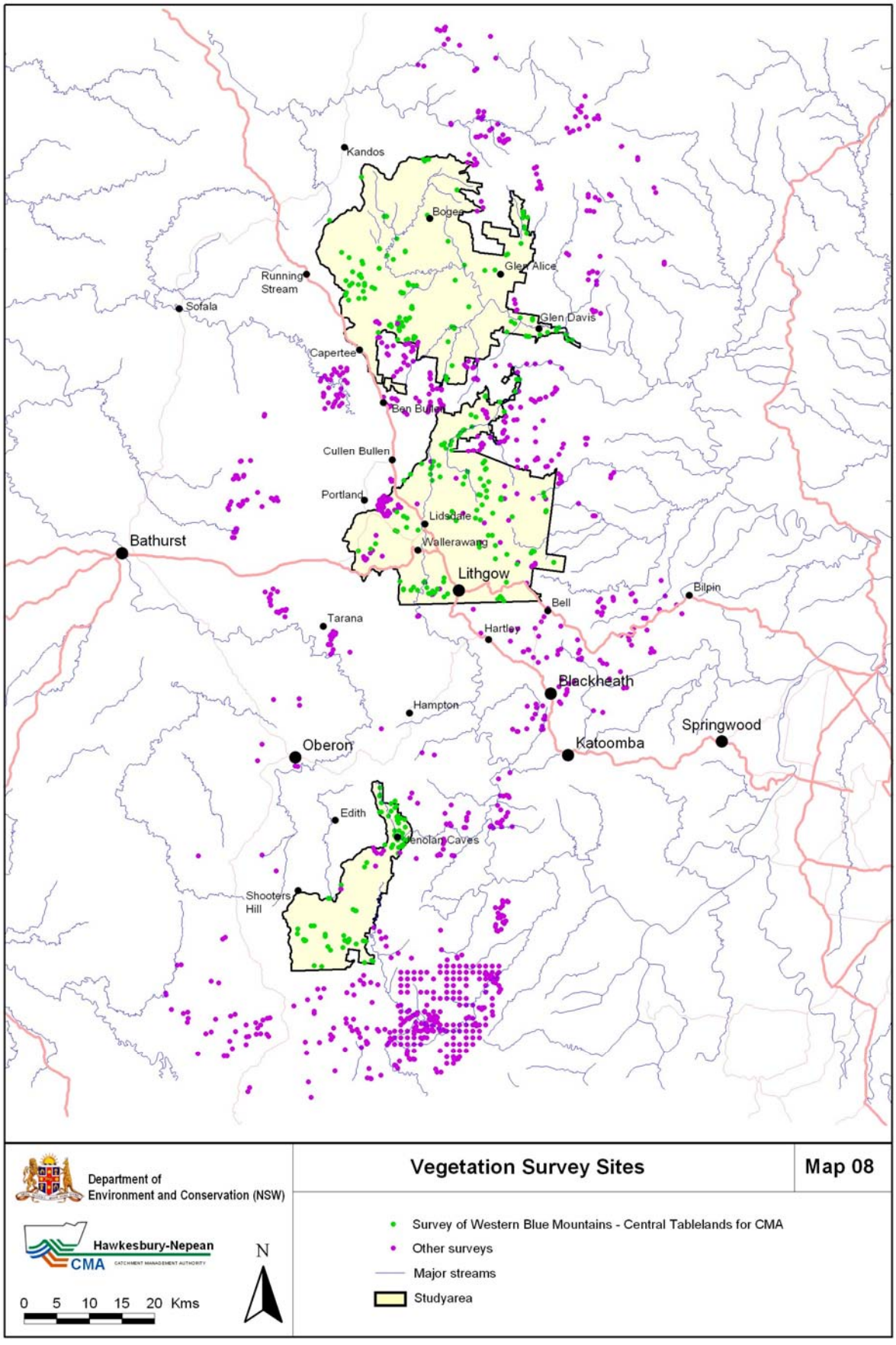
- Over 95 percent were found to be within a tolerance of 37.5 metres. Spatial accuracy is best on flat to undulating topography of the plateaux and plains and worst on the steep escarpment slopes and dissected gorges of the sandstone tablelands where displacement is greatest.
- Coding transfer error between photo linework and digital coverage was found to be less than one percent based on a sample review of original coding attribute and digital coverage.

3.2.2 Vegetation Cover

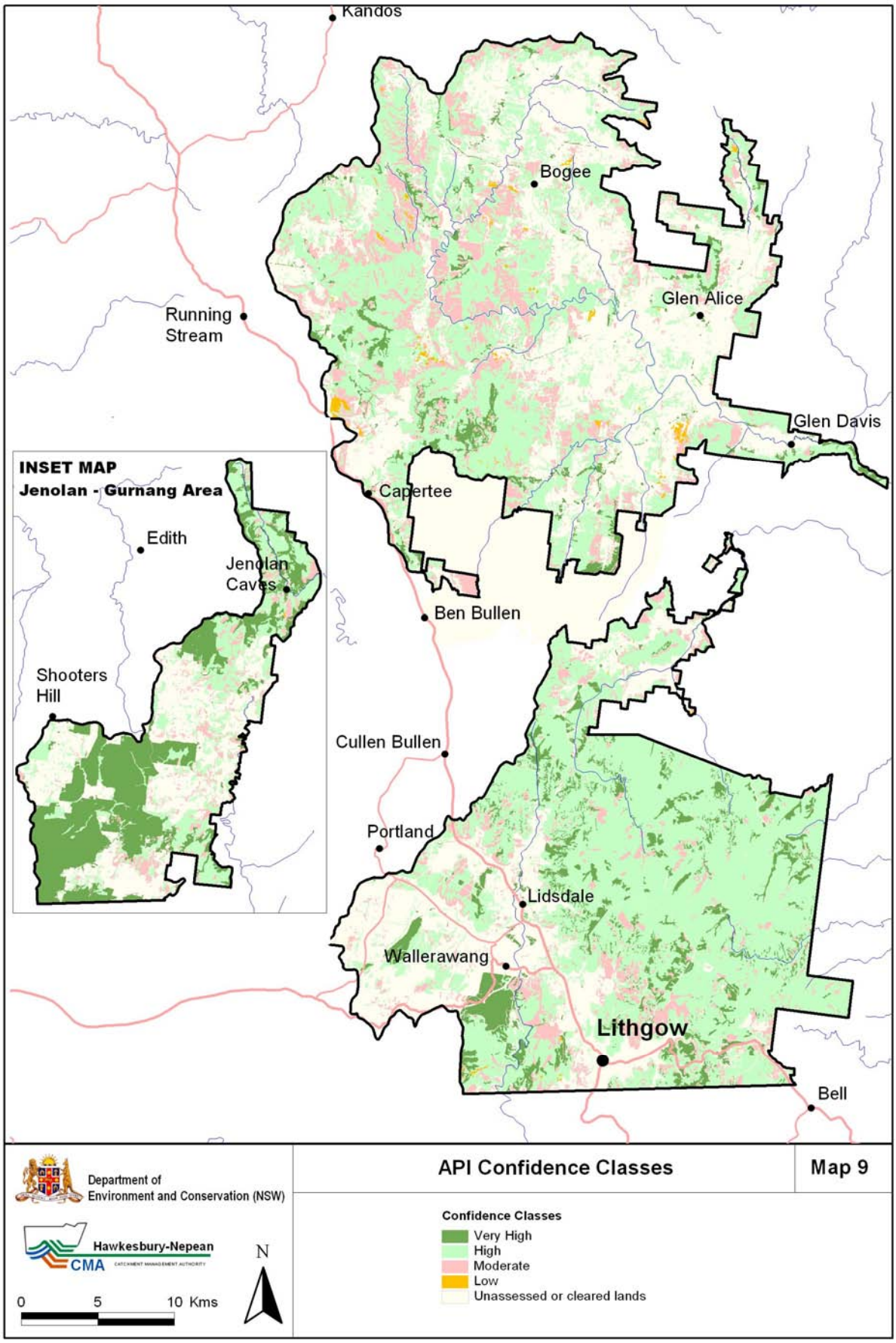
The combined coverage's of vegetation mapping indicate that almost 100 000 hectares have been identified as native vegetation cover. This comprises over 62 percent of the mapping study area. Table 3.1 below indicates the area and proportion of broad mapping features found in the study area.

TABLE 3.1: BROAD MAPPING FEATURES WITH AREA AND PROPORTION OF STUDY AREA

Broad Mapping Feature	Area (ha)	Proportion (%)
Native Vegetation Cover	99752	62.50
Cleared-Severely Disturbed Land	50143	31.43
Plantation and Woodlot	8972	5.62
Exposed Rock	62	0.003
Unassessed Vegetation	660	0.004
Total	159589	100



Map 8: Vegetation Survey Sites



Map 9: API Confidence Classes

3.2.3 Interpretation Confidence

The classes describing the confidence in the interpretation of the landscape features are shown in Map 9 and provided in Table 3.2 below. Over 75 percent of the study area was mapped with a high or very high level of confidence based on either visitation of sites or the extrapolation of patterns based on visited areas (as described in Section 2.8). Lower confidence levels were recorded in areas that presented unique photo patterns to the interpreter. In most instances these are located in areas that were inaccessible as a result of tenure or terrain.

TABLE 3.2: API CONFIDENCE CLASSES WITH AREA AND PROPORTION OF STUDY AREA

Interpretation Confidence	Area (ha)	Proportion (%)
Very High	16506	10.34
High	72240	45.26
Medium	19300	29.94
Low	490	12.09
Unassessed or Cleared	61444	38.50
Total	159589	100

3.3 FLORISTIC DIVERSITY AND SPECIES RICHNESS

The study area spans two botanical divisions, the Central Coast and Central Tablelands. Some 1551 indigenous species have been recorded from all field data used in the analysis. The full list of native species found in the study area and adjoining environs is presented in Appendix B.

Species richness was estimated as the mean number of species found within each vegetation community using standard sites of 400 square metres. Mean richness scores varied between nine and 49.1 taxa per site. The results for each individual community are presented in each vegetation community profile (Appendix A). Communities supporting lower richness scores generally included swamp, mallee and heath communities. Forests on shale or basalt soil and on sheltered aspects of the escarpment slopes or within the gorges of the sandstone plateau support the highest mean species richness scores.

3.4 VEGETATION CLASSIFICATION

Quantitative analysis of all site data suggested 100 groups when a dissimilarity score of 0.93 was applied to classify the floristic variation. Figure 3.1 illustrates the hierarchal relationships between these groups, and displays relationships with other classifications developed by Tindall *et al.* (2004) and Bell (1998). These groups of sites underpin the definition of each of the vegetation communities described in this report.

In all 53 vegetation communities were extracted from the analysis to describe patterns in native vegetation cover and composition in the study area. Stand alone map unit numbers were allocated to each, while a further three additional communities were split using detailed aerial photograph interpretation to highlight structural variations in the parent community.

The selection of these communities from the pool of 100 groups was achieved by firstly ensuring that all groups that featured a sample site located within the study area were included. Secondly any groups that described vegetation communities found on environmental domains not present in the study area were excluded. This latter process excluded a number of groups associated with the Kowmung Valley, central Wollemi National Park, dry tablelands environments of Bathurst and adjoining ranges as well as basalt caps in the Blue Mountains. These are noted within Figure 3.1 as occurring outside. Patterns achieved from the aerial photo stages were then compared to highlight any potential gaps in vegetation patterns not sampled by sites located within the study area.

Of the 53 vegetation communities 22 were related to existing classifications of Tindall *et al.* (2004) and four of Bell (1998). Vegetation communities were said to be equivalent where any sample site used to define a community in previous studies formed a component of site groups achieved during this analysis. Where more than one classification unit from previous studies was present within a group of sites then the classification with the majority number of sites was used.

Figure 3.1 illustrates twelve broad clusters of site groups that describe similar landscape and floristic features. These are resolved to finer site groups that have been used to define each vegetation community or map unit.

The first cluster identifies Sydney Montane Dry Sclerophyll Forests (Keith 2004) found on the Newnes Plateau and adjoining Narrabeen Sandstones. Map units (26 & 28) describing the highest elevation exposed sandstone sclerophyll forests were not defined by any sites used in previous analysis, while MU30 was strongly related to classifications used by both Tindall *et al.* (2004) and Bell (1998). The second cluster assembles taller forests found on sheltered narrabeen sandstones at elevations above 700 metres ASL as well as exposed forests found on residual permian sediments. The most sheltered of these forests (MU8) did not share an overlap with sites used to describe previous classifications. This is likely to arise from undersampling in the upper mountains area, as the community is present in the Mount Victoria area. The latter groups however achieved strong associations with previous classifications.

Montane Heaths (Keith 2004) are highly variable. The third broad cluster describes them. MU44 and MU46 both share sites used to describe the Blue Mountains Heath (Tindall *et al.* 2004), however each of the map units occupy very different landscape positions. MU47 is an unusual feature of Genowlan Point and sites were equivocal between the Ti willa Kanangra Heaths and Blue Mountains Heath (*ibid*). The distinctive pagodas of the western Blue Mountains support a very sparse heath cover, and this is recognised by MU43. This is closely related to the Pagoda heaths of Bell (1998), while only a single site from the Blue Mountains Heath of Tindall *et al.* (2004) was a member of this group.

The fourth cluster describes shrub/grass forests and woodlands found on Permian sediments along the dividing range between Lithgow and Capertee. A poor association with other classifications was achieved within this cluster largely because it is describing environmental domains not previously sampled. Only MU31 was strongly related to grassy tablelands forests of Tindall *et al*. (2004).

No associations were achieved within the next cluster, where the low rainfall grassy woodlands of the Capertee Valley are described. These forests and woodlands are more typical of the central western slopes of NSW and there are few similar environments present within other areas of the Hawkesbury – Nepean catchment.

Cluster eight describes Tableland Grassy Woodlands found in the western Lithgow valley. Again many of these environments have been sampled for the first time, and it is not surprising that there were few overlaps with sites describing regional communities. Only a single site from Regional Map Unit 17 was included within the site group used to describe MU33.

This was not the case for the next two clusters, describing exposed grassy woodlands and taller sheltered forests of the eastern tableland around the Oberon and Lithgow Plateaux. Many sites were encompasses from several studies within these clusters, although MU35 and MU6 included sites from multiple regional units. This may relate to a higher numbers of observers used within these clusters of sites and may also go some way to explaining the number of affiliated communities that occur just outside the study area boundary.

Tall grassy forests associated with riparian zones and hollow depressions are described by Cluster 9. Many sites were shared between the regional analysis of Tindall *et al.* (2004) and this study. Only the lower elevations associated with MU15 and the considerably drier environments of MU20 did not warrant equivalence between the studies.

Swamps and montane bogs and wetlands are another highly variable community (Cluster10). Our analysis indicated that a large number of these communities appear to occur outside of the study area, particularly those associated with Blue Mountains sandstones. The Newnes Plateau Shrub Swamps (MU50 & 51) were clearly distinguished from other upland swamp communities associated with the Kings Tableland in Blue Mountains NP. Similarly the Capertee Melaleuca Thickets were not found to be associated with any previous classification. However the grassy fens (MU53) are part of a more extensive assemblage found across the southern tableland.

Only small areas of warm temperate rainforest (Cluster 11) are present in the study areas on the Newnes Plateau. These form part of a widespread sandstone gully rainforest found across the Sydney Basin.

The final cluster describes a large number of forests growing on sheltered aspects in riarpian situations or escarpment slopes. These forests are generally herbaceous and shrubby associated with fine -grained loamy soils derived from shales, basalt, limestone, porphory and alluvium. A number of groups within this cluster were associated with the southern Kowmung gorges and were not considered further. However the upper reaches of this gorge country around Jenolan Caves did include a number of sites describing grassy woodlands that are more extensive throughout the northern Kowmung and Kanangra gorges. The limestone (karst) of the Jenolan Caves area is a distinctive assemblage, and a number of structural forms have been identified to describe the vegetation on the limestone outcrops.

Figure 3.1: Hierarchal Classification of Vegetation Communities

Broad Descriptor	Regional Map Unit Name	Map Unit Name
	No Match	MU26 Newnes Plateau Narrow-leaved Peppermint-Silvertop Ash Layered Open Forest
	No Match	MU26a
	DSF136	MU30 Exposed Blue Mountains Sydney Peppermint-Silvertop Ash Shrubby Woodland
		outside (Wollemi)
		outside (Wollemi)
Exposed Montane Narrabeen Sandstone Forests and Woodlands	No Match	MU27 Mount Airly Sydney Peppermint-Narrow-leaved Stringybark-Silvertop Ash Shrubby Woodland
		outside (Wollemi)
	No match	MU8 Newnes Sheltered Peppermint-Brown Barrel Shrubby Foret
	DSF136	MU29 Sandstone Slopes Sydney Pepermint Shrubby Forest
	DSF136	MU28 Sandstone Plateau and Ridge Scribbly Gum-Silvertop Ash shrubby Woodland
Montane Sheltered Sandstone and Exposed Permian Forests	DSF8	MU25 Montane Exposed Silvertop Ash Wodland
	DSF8?	MU24 Montane Slopes Stringybark Forest
	HL124	MU44 Sandstone Plateaux Tea Tree - Dwarf Sheoak-Banksia Rocky Heath
	HL124	MU46 Newnes Plateau Dwarf Sheoak - Banksia
	HL124/HL120	MU47 Genowlan Point Dwarf Sheoak Heathland
		outside (southern)
		Outside (Loombah Heath)
	no match	MU43 Pagoda Rock Sparse Shrubland
		outside (Wollemi)
Montane Heaths		outside (Wollemi)
	no match	MU32 Tableland Scribbly Gum-Narrow-leaved Stringybark Shrubby Open Forest
		outside
		outside
		outside
	no match	MU38 Capertee Grey Gum - Narrow-leaved Stringybark-Scribbly Gum-Callitris Shrubby Forest
	no match	MU39 Capertee Hills Blue-leaved Ironbark-Callitris Shrubby Forest
	no match	MU42 Capertee Hills White Box-Tumbledown Redgum-Ironbark-Callitris Shrubby Woodland
	DSF14	MU31 Montane Ridge Broad-leaved Peppermint-Mountain Gum Grassy Forest
		outside
		outside
		outside
Exposed Tablelands Shrubby Woodlands		outside
	no match	MU21 Capertee-Wolgan Slopes Red Box-Grey Gum-Stringybark Grassy Woodland
	no match	MU20 Capertee Roughbarked Apple-Redgum-Yellow Box Grassy Woodland
	no match	MU19 Capertee Box-Narrow-leaved Ironbark-Callitris Grassy Woodland & MU18 Capertee Marl Grassy Box Woodland
	no match	MU41 Capertee Slopes Slaty Gum-Grey Gum-Mugga-Callitris Open Forest
Capertee Permian Grassy Dry Forests and Woodlands	no match	MU16 Capertee Limestone Hills Grey Box-Grass Tree-Spinifex Grassy Woodland
	no match	MU17 Capertee Box-Kurrajong-Grey Gum Grassy Woodland
Tableland Grassy Woodlands (mid elevation)	no match	MU33 Coxs Permian Red Stringybark-Brittle Gum Woodland
	no match	MU36 Tableland Apple Box-Bursaria Grassy Open Forest
	GW23/GW17	MU33 Tableland Broad-leaved Peppermint-Brittle Gum-Red Stringybark Grassy Open Forest
	no match	MU7 Newnes Plateau Narrow-leaved Peppermint- Mountain Gum-Brown Stringybark Layered Forest
High ElevationTableland Exposed Grassy Forests	MU73/MU14/MU8	MU35 Tableland Gully Mountain Gum-Broadleaved Peppermint Grassy Forest
	no match	MU14 Tableland Mountain Gum-Snow Gum-Daviesia Montane Open Forest
	WSF73	MU6 Montane Sheltered Narrow-leaved Peppermint Forest
	WSF73	MU5 Jenolan Brown Barrel-Mountain Gum-Narrow-leaved Peppermint-Blackwood Montane Grassy Forest
	WSF73	MU4 Sheltered Gully Brown Barrel Ferny Forest
		outside
		outside
		outside
Tableland Sheltered Forests		outside(Megalong)
		outside (Kowmung Valley)
	no match	MU15 Tableland Hollows Black Gum-Black Sally Grassy Open Forest
	GW220	MU11 Tableland Gully Snow Gum-Ribbon Gum Grassy Forest
	GW19/GW520	MU13 Tableland Ribbon Gum-Blackwood-Apple Box Forest
	no match	MU55 Tableland Riparian Scrub Complex
	GW220	MU9 Mount Vincent Basalt Ribbon Gum Grassy Forest
	GW23	MU34 Tableland Slopes Brittle Gum-Broad-leaved Peppermint Grassy Forest
	GW17	MU12 Lithgow-Abercrombie Grassy Woodland
		outside
		outside
TablelandsTall Grassy Forests		outside
	FRW130	MU50 & MU51 Newnes Plateau Shrub Swamps
	GL257	MU53 Mountain Hollow Grassy Fen
	FOW54	MU52 Newnes Plateau Rush-Sedge Snow Gum Hollow Wooded Heath
		outside
		outside
		outside
		outside
		outside
		outside

3.5 MAPPING DISTRIBUTION OF VEGETATION COMMUNITIES

A total of 57 vegetation communities have been mapped within the study area along with six additional landscape features. The distribution of the statewide vegetation classes (Section 3.4) is shown in Map 10. Table 3.3 indicates the total area for each vegetation community grouped into structural classes. Structural classifications are based on tree height and crown separation (Walker and Hopkins, 1990).

TABLE 3.3: MAP UNITS DESCRIBED IN THE STUDY AREA

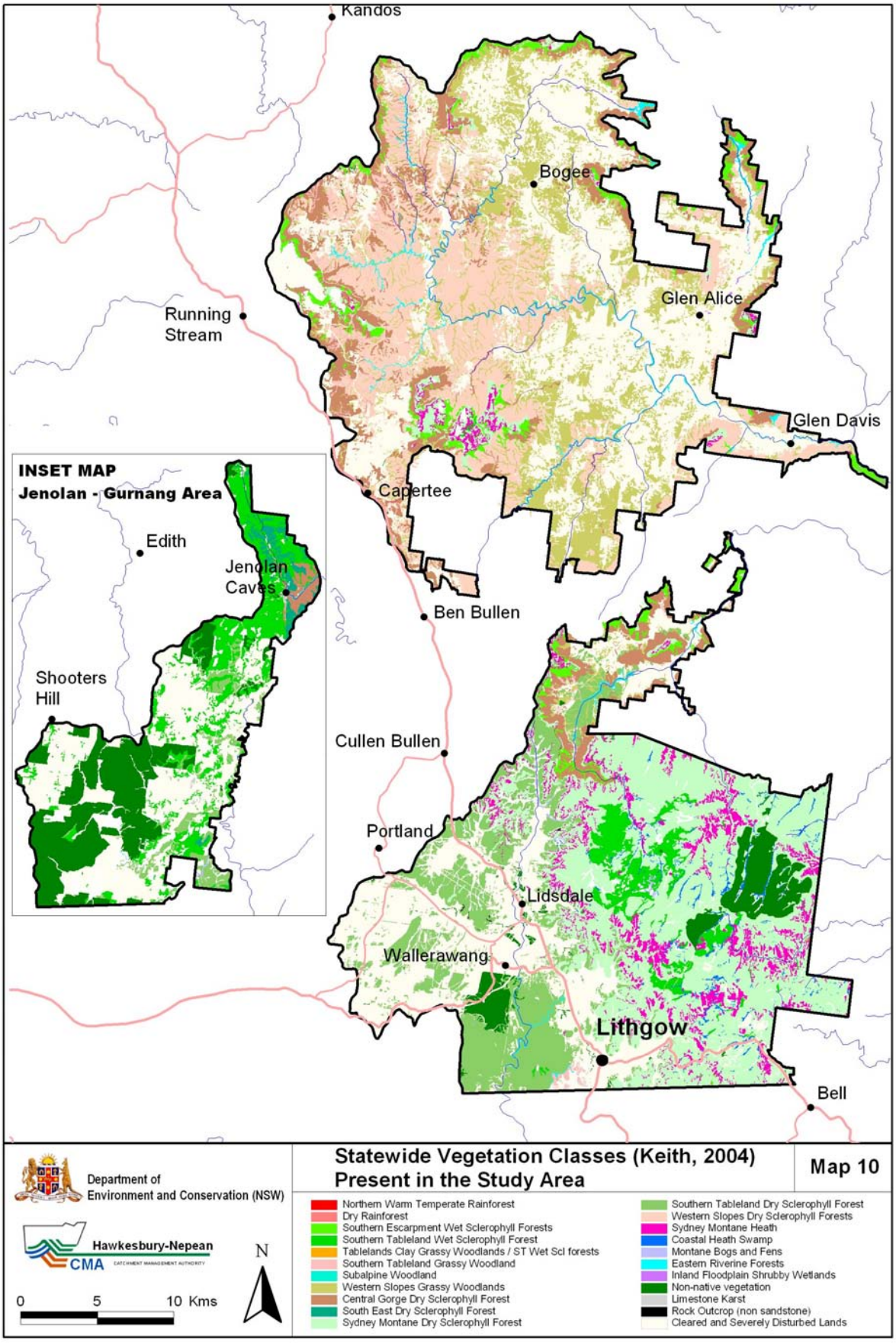
Map Unit	Region Map Unit Name (Tindall *et al.* 2004)	State-wide Vegetation Class (Keith 2004)	Map Unit Area within Study Area (ha)
1 Sandstone Gully Warm Temperate Rainforest	RF114 Sandstone Scarp Warm Temperate Rainforest	Northern Warm Temperate Rainforest	4
2 Mountain Gully Grey Myrtle Dry Rainforest	RF38 Grey Myrtle Dry Rainforest	Dry Rainforest	39
3 Hillslope Talus Mountain Gum - Brown Stringybark - Grey Gum - Broad-leaved Hickory Moist Forest	No match	Southern Escarpment Wet Sclerophyll Forests	2695
4 Sheltered Gully Brown Barrel Ferny Forest	WSF73 Cool Montane Wet Forest	Southern Tableland Wet Sclerophyll Forest	71
5 Jenolan Brown Barrel - Mountain Gum - Narrow-leaved Peppermint - Blackwood Montane Grassy Forest	WSF73 Cool Montane Wet Forest	Southern Tableland Wet Sclerophyll Forest	2691
6 Montane Sheltered Narrow-leaved Peppermint Forest	WSF73 Cool Montane Wet Forest	Southern Tableland Wet Sclerophyll Forest	1701
7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	No match	Southern Tableland Wet Sclerophyll Forest	2477
8 Newnes Sheltered Peppermint - Brown Barrel Shrubby Forest	No match	Sydney Montane Dry Sclerophyll Forest	2200
9 Mount Vincent Basalt Ribbon Gum Grassy Forest	GW20 Tablelands Basalt Forest	Tableland Clay Grassy Woodland	303
10 Capertee Residual Basalt Brittle Gum - Stringybark Layered Open Forest	No match	Tableland Clay Grassy Woodland	142
11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	GW520 Tableland Swamp Flats Forest	Tableland Clay Grassy Woodland	1586
12 Lithgow - Abercrombie Grassy Woodland	GW17 Lithgow - Abercrombie Grassy Woodland	Southern Tableland Grassy Woodland	122
13 Tableland Gully Ribbon Gum - Blackwood - Apple Box Forest	GW19 Abercrombie-Tarlo Footslope Woodland/ GW520 Tableland Swamp Flats Forest	Southern Tableland Grassy Woodland	861
14 Tableland Mountain Gum - Snow Gum - Daviesia Montane Open Forest	No match	Subalpine Woodlands	1739
15 Tableland Hollows Black Gum - Black Sally Open Forest	GW520 Tableland Swamp Flats Forest	Subalpine Woodlands	384
16 Capertee Limestone Hills Grey Box - Grass Tree - Spinifex Grassy Woodland	No match	Western Slopes Grassy Woodlands	108
17 Capertee Box - Kurrajong - Grey Gum Grassy Woodlands	No match	Western Slopes Grassy Woodlands	1532
18 Capertee Marl Box Grassy Woodlands	No match	Western Slopes Grassy Woodlands	1141
19 Capertee Box - Narrow-leaf Ironbark - Callitris Grassy Woodland	No match	Western Slopes Grassy Woodlands	5551

Map Unit	Region Map Unit Name (Tindall *et al.* 2004)	State-wide Vegetation Class (Keith 2004)	Map Unit Area within Study Area (ha)
20 Capertee Rough-barked Apple - Redgum - Yellow Box Grassy Woodlands	No match	Western Slopes Grassy Woodlands	5457
21 Capertee - Wolgan Slopes Red Box - Grey Gum - Stringybark Grassy Open Forest	No match	Central Gorge Dry Sclerophyll Forest	9369
22 Kanangra Gorge Sheltered Grey Gum Forest	DSF37 Kowmung-Wollondilly Grassy Gorge Forest	Central Gorge Dry Sclerophyll Forest	342
23 Jenolan Limestone Scrub Woodland	No match	Central Gorge Dry Sclerophyll Forest	66
24 Montane Slopes Stringybark Forest	DSF8 Tableland Ridge Forest	South East Dry Sclerophyll Forest	428
25 Montane Exposed Silvertop Ash Forest	DSF8 Tableland Ridge Forest	South East Dry Sclerophyll Forest	208
26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest	No match	Sydney Montane Dry Sclerophyll Forest	7601
27 Mount Airly Sydney Peppermint - Narrow-leaved Stringy - Grey Gum Shrubby Open Forest	No match	Sydney Montane Dry Sclerophyll Forest	1041
28 Sandstone Plateau And Ridge Scribbly Gum - Silver-top Ash Shrubby Woodland	DSF136 Blue Mountains Ridgetop Forest	Sydney Montane Dry Sclerophyll Forest	3240
29 Sandstone Slopes Sydney Peppermint Shrubby Forest	DSF136 Blue Mountains Ridgetop Forest	Sydney Montane Dry Sclerophyll Forest	3000
30 Exposed Blue Mountains Sydney Peppermint - Silver-top Ash Shrubby Woodland	DSF136 Blue Mountains Ridgetop Forest	Sydney Montane Dry Sclerophyll Forest	6864
31 Montane Ridge Broad-leaved Peppermint - Mountain Gum Grassy Forest	DSF14 Western Tablelands Dry Forest	Southern Tableland Dry Sclerophyll Forest	1283
32 Tableland Hills Scribbly Gum - Narrow-leaved Stringybark Shrubby Open Forest	No match	Southern Tableland Dry Sclerophyll Forest	1697
33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	GW23 Tableland Hills Grassy Woodland	Southern Tableland Dry Sclerophyll Forest	1041
34 Tableland Slopes Brittle Gum - Broad-leaved Peppermint Grassy Forest	GW23 Tableland Hills Grassy Woodland/GW17 Lithgow Abercrombie Grassy Forest	Southern Tableland Dry Sclerophyll Forest	3077
35 Tableland Gully Mountain Gum - Broad-leaved Peppermint Grassy Forest	MU73 Cool Montane Wet Forest/DSF 14 Western Tablelands Dry Forest/DSF8 Tableland Ridge Forest	Southern Tableland Dry Sclerophyll Forest	797
36 Tableland Apple Box - Bursaria Grassy Open Forest	No match	Southern Tableland Dry Sclerophyll Forest	384
37 Cox's Permian Red Stringybark - Brittle Gum Woodland	DSF14 Western Tablelands Dry Forest	Southern Tableland Dry Sclerophyll Forest	3048
38 Capertee Grey Gum - Narrow-leaved Stringybark - Scribbly Gum - Callitris - Ironbark Shrubby Open Forest	No match	Western Slopes Dry Sclerophyll Forests	9247
39 Capertee Hills Blue-leaved Ironbark - Callitris Shrubby Forest	No match	Western Slopes Dry Sclerophyll Forests	328
40 Capertee Slopes Red Ironbark - Red Stringybark -	No match	Western Slopes Dry Sclerophyll Forests	855

Map Unit	Region Map Unit Name (Tindall *et al.* 2004)	State-wide Vegetation Class (Keith 2004)	Map Unit Area within Study Area (ha)
Narrow-leaved Stringybark Shrubby Woodland			
41 Capertee Slopes Slaty Gum - Grey Gum - Mugga - Callitris Open Forest	No match	Western Slopes Dry Sclerophyll Forests	2004
42 Capertee Hills White Box - Tumbledown Redgum - Ironbark - Callitris Shrubby Woodland	No match	Western Slopes Dry Sclerophyll Forests	5931
43 Pagoda Rock Sparse Shrubland	No match	Sydney Montane Heath	1898
44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath	HL124 Blue Mountains Heath	Sydney Montane Heath	1925
45 Newnes Plateau Tea Tree - Banksia - Mallee Heath	HL124 Blue Mountains Heath	Sydney Montane Heath	144
46 Newnes Plateau Dwarf Sheoak - Banksia Heath	HL124 Blue Mountains Heath	Sydney Montane Heath	296
47 Genowlan Point Dwarf Sheoak Heathland	HL124 Blue Mountains Heath/HL120 Kanangra TiWilla Heath	Sydney Montane Heath	16
48 Limestone Karst	No match	no match	50
49 Rock Outcrop	No match	no match	12
50 Newnes Plateau Shrub Swamp	FRW130 Blue Mtns - Shoalhaven Hanging Swamps	Coastal Heath Swamp	394
51 Newnes Plateau Hanging Swamp	FRW130 Blue Mtns - Shoalhaven Hanging Swamps	Coastal Heath Swamp	274
52 Newnes Plateau Rush - Sedge - Snow Gum Hollow Wooded Heath	FOW 54 Tablelands Swamp Woodland	Montane Bogs and Fens	46
53 Mountain Hollow Grassy Fen	GL257 Tablelands Flats Grassland	Montane Bogs and Fens	98
54 Capertee - Wolgan Riparian Rough-barked Apple - River Oak Open Forest	No match	Eastern Riverine Forests	1142
55 Tableland Riparian Scrub Complex	FRW55 Riparian Herbfields (possible only)	Eastern Riverine Forests	119
56 Wolgan Riparian Scrub Complex	FRW55 Riparian Herbfields (possible only)	Eastern Riverine Forests	43
57 Capertee Riparian Melaleuca Thickets	No Match	Inland Floodplain Shrubby Wetlands	32
59 Non-native Vegetation - Pine plantation / woodlot / shelter	Non-native vegetation	Non-native vegetation	8872
60 Non-native Vegetation - Other exotics (willow etc)	Non-native vegetation	Non-native vegetation	97
61 Unclassified (<1ha patch of remnant vegetation adjacent / within cleared lands)	No match	No match	660
62 Cleared and Severely Disturbed Lands	Cleared and Severely Disturbed Lands	Cleared and Severely Disturbed Lands	50143
Total			157356

3.6 RESERVATION STATUS ASSESSMENT

Table 3.4 presents figures describing the regional reservation status for each vegetation community. The region refers to the Hawkesbury – Nepean catchment. Reservation Status is calculated for the area (hectares) and proportion (percent) of each vegetation community located within NPWS estate, as at May 2004.



Map 10: State-wide Vegetation Classes Present in the Study Area

TABLE 3.4: RESERVATION STATUS, CLEARING LOSS, REGIONAL AND STATEWIDE VEGETATION CLASS BY MAP UNIT

Map Unit	Primary Regional Map Unit	State	Map Unit Area Within Study Area (ha)	Estimated Extant Area in HNCMA (ha)	Estimate of Clearing in HNCMA (%)	Estimate of Pre-Clearing Area in DEC Estate
1 Sandstone Gully Warm Temperate Rainforest	RF114 Sandstone Scarp Warm Temperate Rainforest	Northern Warm Temperate Rainforest	4	>7200	5-20%	95%
2 Mountain Gully Grey Myrtle Dry Rainforest	RF38 Grey Myrtle Dry Rainforest	Dry Rainforest	39	7500	25-45%	70%
3 Hillslope Talus Mountain Gum - Brown Stringybark - Grey Gum - Broad-leaved Hickory Moist Forest	No match	Southern Escarpment Wet Sclerophyll Forests	2695	2695	30-70%	10-30%
4 Sheltered Gully Brown Barrel Ferny Forest	WSF73 Cool Montane Wet Forest	Southern Tableland Wet Sclerophyll Forest	71	6000	10-30%	60-70%
5 Jenolan Brown Barrel - Mountain Gum - Narrow-leaved Peppermint - Blackwood Montane Grassy Forest	WSF73 Cool Montane Wet Forest	Southern Tableland Wet Sclerophyll Forest	2691	103200	10-30%	45-55%
6 Montane Sheltered Narrow-leaved Peppermint Forest	WSF73 Cool Montane Wet Forest	Southern Tableland Wet Sclerophyll Forest	1701	37000	10-30%	50-60%
7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	No match	Southern Tableland Wet Sclerophyll Forest	2477	2477	10-30%	0%
8 Newnes Sheltered Peppermint - Brown Barrel Shrubby Forest	No match	Sydney Montane Dry Sclerophyll Forest	2200	3000	10-30%	0-10%
9 Mount Vincent Basalt Ribbon Gum Grassy Forest	GW20 Tablelands Basalt Forest	Tableland Clay Grassy Woodland	303	7400	80-95%	<2%
10 Capertee Residual Basalt Brittle Gum - Stringybark Layered Open Forest	No match	Tableland Clay Grassy Woodland	142	142	50-70%	0%
11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	GW520 Tableland Swamp Flats Forest	Tableland Clay Grassy Woodland	1586	10500	65-80%	<10%
12 Lithgow - Abercrombie Grassy Woodland	GW17 Lithgow - Abercrombie Grassy Woodland	Southern Tableland Grassy Woodland	122	222	45-65%	0%
13 Tableland Gully Ribbon Gum - Blackwood - Apple Box Forest	No match	Southern Tableland Grassy Woodland	861	861	>70%	0%
14 Tableland Mountain Gum - Snow Gum - Daviesia Montane Open Forest	No match	Subalpine Woodlands	1739	1739	30-70	0%
15 Tableland Hollows Black Gum - Black Sally Open Forest	GW520 Tableland Swamp Flats Forest	Subalpine Woodlands	384	384	95%	0%

Map Unit	Primary Regional Map Unit	State	Map Unit Area Within Study Area (ha)	Estimated Extant Area in HNCMA (ha)	Estimate of Clearing in HNCMA (%)	Estimate of Pre-Clearing Area in DEC Estate
16 Capertee Limestone Hills Grey Box - Grass Tree - Spinifex Grassy Woodland	No match	Western Slopes Grassy Woodlands	108	108	10-30%	0%
17 Capertee Box - Kurrajong - Grey Gum Grassy Woodlands	No match	Western Slopes Grassy Woodlands	1532	1532	>70%	0%
18 Capertee Marl Box Grassy Woodlands	No match	Western Slopes Grassy Woodlands	1141	1141	>70%	0%
19 Capertee Box - Narrow-leaf Ironbark - Callitris Grassy Woodland	No match	Western Slopes Grassy Woodlands	5551	5551	>70%	0%
20 Capertee Rough-barked Apple - Redgum - Yellow Box Grassy Woodlands	No match	Western Slopes Grassy Woodlands	5457	5457	>70%	0%
21 Capertee - Wolgan Slopes Red Box - Grey Gum - Stringybark Grassy Open Forest	No match	Central Gorge Dry Sclerophyll Forest	9369	9369	10-30%	10-20%
22 Kanangra Gorge Sheltered Grey Gum Forest	DSF37 Kowmung-Wollondilly Grassy Gorge Forest	Central Gorge Dry Sclerophyll Forest	342	11809	<10%	>90%
23 Jenolan Limestone Scrub Woodland	No match	Central Gorge Dry Sclerophyll Forest	66	66	<10%	100%
24 Montane Slopes Stringybark Forest	DSF8 Tableland Ridge Forest	South East Dry Sclerophyll Forest	428	10000	10-20%	>70%
25 Montane Exposed Silvertop Ash Forest	DSF8 Tableland Ridge Forest	South East Dry Sclerophyll Forest	208	22508	10-20%	>50%
26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest	No Match	Sydney Montane Dry Sclerophyll Forest	7601	28640	10-20%	>80%
27 Mount Airly Sydney Peppermint - Narrow-leaved Stringy - Grey Gum Shrubby Open Forest	No match	Sydney Montane Dry Sclerophyll Forest	1041	28640	10-20%	>80%
28 Sandstone Plateau And Ridge Scribbly Gum - Silver-top Ash Shrubby Woodland	DSF136 Blue Mountains Ridgetop Forest	Sydney Montane Dry Sclerophyll Forest	3240	28640	10-20%	>80%
29 Sandstone Slopes Sydney Peppermint Shrubby Forest	DSF136 Blue Mountains Ridgetop Forest	Sydney Montane Dry Sclerophyll Forest	3000	15300	10-20%	>80%
30 Exposed Blue Mountains Sydney Peppermint - Silver-top Ash Shrubby Woodland	DSF136 Blue Mountains Ridgetop Forest	Sydney Montane Dry Sclerophyll Forest	6864	28640	10-20%	>80%
31 Montane Ridge Broad-leaved Peppermint - Mountain Gum Grassy Forest	DSF14 Western Tablelands Dry Forest	Southern Tableland Dry Sclerophyll Forest	1283	111800	35-55%	<15%
32 Tableland Hills Scribbly Gum - Narrow-leaved Stringybark Shrubby Open Forest	No match	Southern Tableland Dry Sclerophyll Forest	1697	111800	35-55%	<15%

Map Unit	Primary Regional Map Unit	State	Map Unit Area Within Study Area (ha)	Estimated Extant Area in HNCMA (ha)	Estimate of Clearing in HNCMA (%)	Estimate of Pre-Clearing Area in DEC Estate
33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	GW23 Tableland Hills Grassy Woodland	Southern Tableland Dry Sclerophyll Forest	1041	18800	60-80%	<2%
34 Tableland Slopes Brittle Gum - Broad-leaved Peppermint Grassy Forest	GW23 Tableland Hills Grassy Woodland	Southern Tableland Dry Sclerophyll Forest	3077	18800	60-80%	<2%
35 Tableland Gully Mountain Gum - Broad-leaved Peppermint Grassy Forest	No match	Southern Tableland Dry Sclerophyll Forest	797	797	>70%	0%
36 Tableland Apple Box - Bursaria Grassy Open Forest	No match	Southern Tableland Dry Sclerophyll Forest	384	384	>70%	0%
37 Cox's Permian Red Stringybark - Brittle Gum Woodland	DSF14 Western Tablelands Dry Forest	Southern Tableland Dry Sclerophyll Forest	3048	18800	60-80%	<2%
38 Capertee Grey Gum - Narrow-leaved Stringybark - Scribbly Gum - Callitris - Ironbark Shrubby Open Forest	No match	Western Slopes Dry Sclerophyll Forests	9247	9247	20-40%	0%
39 Capertee Hills Blue-leaved Ironbark - Callitris Shrubby Forest	No match	Western Slopes Dry Sclerophyll Forests	328	328	<10%	0%
40 Capertee Slopes Red Ironbark - Red Stringybark - Narrow-leaved Stringybark Shrubby Woodland	No match	Western Slopes Dry Sclerophyll Forests	855	855	<10%	0%
41 Capertee Slopes Slaty Gum - Grey Gum - Mugga - Callitris Open Forest	No match	Western Slopes Dry Sclerophyll Forests	2004	2004	<10%	10-15%
42 Capertee Hills White Box - Tumbledown Redgum - Ironbark - Callitris Shrubby Woodland	No match	Western Slopes Dry Sclerophyll Forests	5931	5931	<10%	0%
43 Pagoda Rock Sparse Shrubland	No match	Sydney Montane Heath	1898	5000	<1%	>99%
44 Sandstone Plateaux Tea Tree - Dwarf Sheoak - Banksia Rocky Heath	HL124 Blue Mountains Heath	Sydney Montane Heath	1925	8000	<5%	70-85%
45 Newnes Plateau Tea Tree - Banksia - Mallee Heath	HL124 Blue Mountains Heath	Sydney Montane Heath	144	8000	<5%	70-85%
46 Newnes Plateau Dwarf Sheoak - Banksia Heath	HL124 Blue Mountains Heath	Sydney Montane Heath	296	8000	<5%	70-85%
47 Genowlan Point Dwarf Sheoak Heathland	HL124 Blue Mountains Heath	Sydney Montane Heath	16	16	0	0%
48 Limestone Karst	No match	no match	50			0%
49 Rock Outcrop	No match	no match	12			0%
50 Newnes Plateau Shrub Swamp	FRW130 Blue Mtns - Shoalhaven	Coastal Heath Swamp	394	>500	<10%	0%

Map Unit	Primary Regional Map Unit	State	Map Unit Area Within Study Area (ha)	Estimated Extant Area in HNCMA (ha)	Estimate of Clearing in HNCMA (%)	Estimate of Pre-Clearing Area in DEC Estate
	Hanging Swamps					
51 Newnes Plateau Hanging Swamp	FRW130 Blue Mtns - Shoalhaven Hanging Swamps	Coastal Heath Swamp	274	>501	<10%	0%
52 Newnes Plateau Rush - Sedge - Snow Gum Hollow Wooded Heath	FOW 54 Tablelands Swamp Woodland	Montane Bogs and Fens	46	1700	50-80%	50-70%
53 Mountain Hollow Grassy Fen	GL257 Tablelands Flats Grassland	Montane Bogs and Fens	98	1300	75-85%	<5%
54 Capertee - Wolgan Riparian Rough-barked Apple - River Oak Open Forest	No match	Eastern Riverine Forests	1142	1142	30-70%	5%
55 Tableland Riparian Scrub Complex	FRW55 Riparian Herbfields (nearest)	Eastern Riverine Forests	119	n/a	n/a	0%
56 Wolgan Riparian Scrub Complex	FRW55 Riparian Herbfields (nearest)	Eastern Riverine Forests	43	n/a	n/a	!0-20%
57 Capertee Riparian Melaleuca Thickets	No Match	Inland Floodplain Shrubby Wetlands	32	32	>70%	0%
59 Non-native Vegetation - Pine plantation / woodlot / shelter	Non-native vegetation	Non-native vegetation	8872	n/a	n/a	0%
60 Non-native Vegetation - Other exotics (willow etc)	Non-native vegetation	Non-native vegetation	97	n/a	n/a	0%
61 Unclassified (<1ha patch of remnant vegetation adjacent / within cleared lands)	No match	No match	660	n/a	n/a	0%
62 Cleared and Severely Disturbed Lands	Cleared and Severely Disturbed Lands	Cleared and Severely Disturbed Lands	50143	n/a	n/a	0%
63 Other mapping	No match	Western Slopes Grassy Woodlands	11362	n/a	n/a	0%

3.7 DISTURBANCE ASSESSMENTS

3.7.1 Disturbance Severity Classes

Evidence of human related impacts over the mapping area is extensive (Map 11) with around 58 000 hectares of land likely to have been cleared or remains as very sparse scattered trees (less than two percent crown canopy cover). Almost a third of the native vegetation cover in the study area displays evidence of high levels of visible disturbance on aerial photographs. This is particularly prevalent across the Newnes and Oberon Plateaux where forestry is a primary land use, and the Capertee Valley where clearing for grazing has fragmented and disturbed significant areas. Evidence of these impacts includes canopy gaps, regrowth trees, soils disturbance, tracks and roading, and weeds.

Disturbance mapping can underestimate impacts in forested areas as impacts may affect subcanopy vegetation and are not always visible using remote-sensing techniques such as those used in this project. Table 3.5 provides a summary of disturbance severity classes across the mapping area.

The impact of disturbance on the composition and structure of vegetation will vary with the type of landuse. Forestry, mining or agriculture for example, will display very different disturbance patterns on photographs. Different components of the ecosystem are affected. These impacts are not quantified for the purposes of this report. However the spatial data can be used to highlight where impacting processes are either still active or have been present in recent years.

TABLE 3.5: AREA AND PROPORTION OF DISTURBANCE SEVERITY CLASSES

Code	Severity Classes	Area (ha)*	Proportion (%)*
A	Low Level Disturbance	26653	16.70
B	Medium Level Disturbance	34516	21.63
C	High Level Disturbance	37677	23.61
	Cleared Land and Plantation	59115	37.04
	Total	159569	

Table 3.6 lists the proportions of each vegetation community that have low, medium and high levels of disturbance. The highly disturbed class is mostly comprised of the scattered trees and regrowth vegetation disturbance type that describe a very open and often significantly disturbed canopy. A range of understorey types may be present varying from improved pasture grass to secondary native grassland. It is often apparent that areas of high disturbance continue to support high levels of native species.

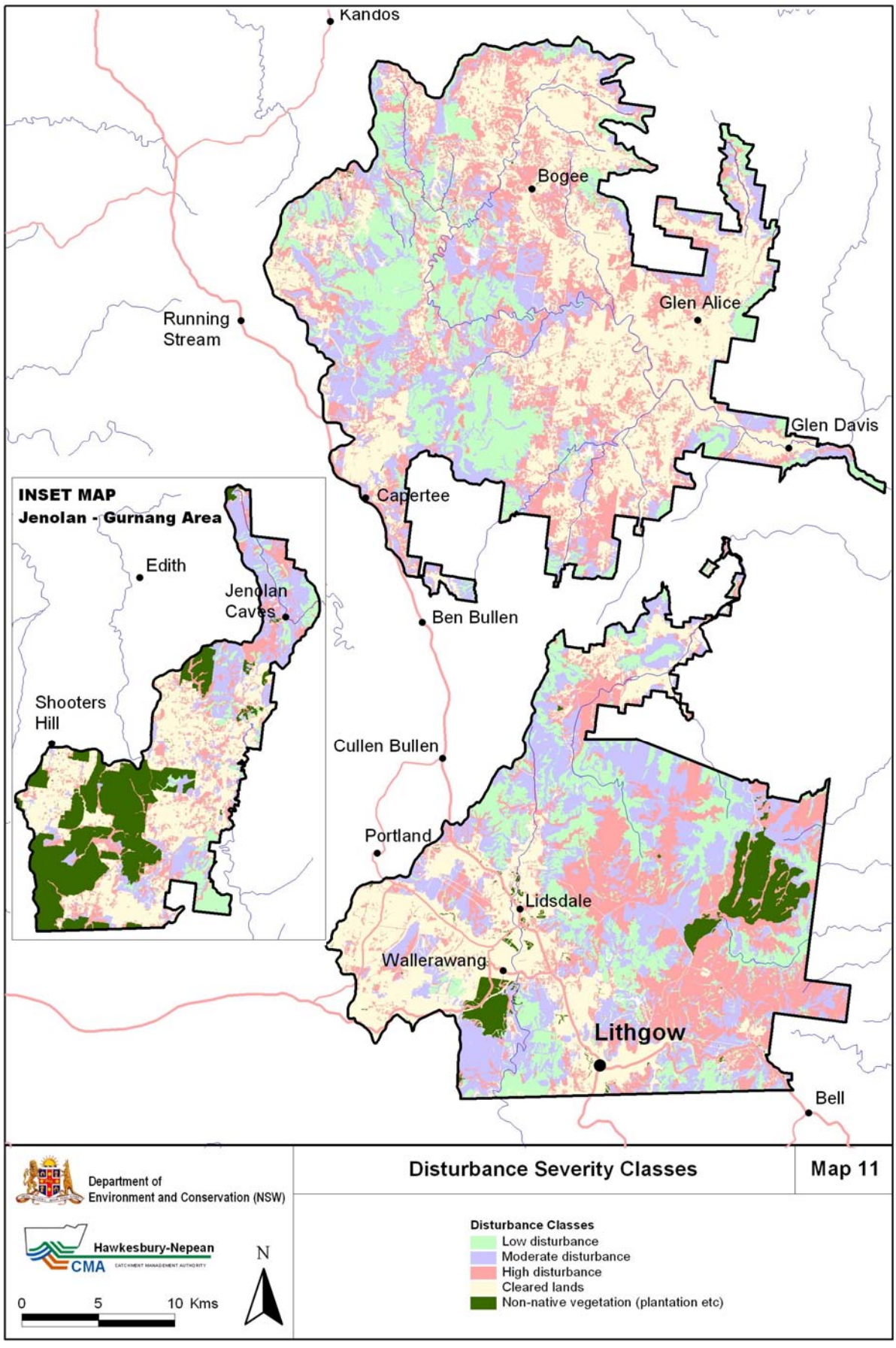
The vegetation communities featuring the highest levels of disturbance are generally those found on landscapes with richer soils such as basalt, alluvium, shale and other fine grained sediments. These are the areas that have historically been subject to intensive agricultural activities such as clearing, logging and grazing. Capertee valley communities, alluvial grassy forests and woodlands and tall montane brown barrel eucalypt forests are examples.

TABLE 3.6: MAP UNIT WITH PROPORTION OF EACH DISTURBANCE INTENSITY CLASS (%) (CELLS HIGHLIGHTED TO SHOW GREATEST PROPORTION)

Map Unit Name	% Low Disturbance	% Moderate Disturbance	% High Disturbance	Total Area (ha)
1 Sandstone Gully Warm Temperate Rainforest	100.0			3
2 Mountain Gully Grey Myrtle Dry Rainforest	76.5	16.4	7.0	38
3 Hillslope Talus Mountain Gum - Brown Stringybark - Grey Gum - Broad-leaved Hickory Moist Forest	52.2	33.0	14.8	2695
4 Sheltered Gully Brown Barrel Ferny Forest	66.5	33.5	0.0	71
5 Jenolan Brown Barrel - Mountain Gum - Narrow-leaved Peppermint - Blackwood Montane Grassy Forest	13.5	48.7	37.7	2690
6 Montane Sheltered Narrow-leaved Peppermint Forest	15.4	42.4	42.2	1700
7 Newnes Plateau Narrow-leaved Peppermint - Mountain Gum - Brown Stringybark Layered Forest	1.7	10.9	87.4	2477
8 Newnes Sheltered Peppermint - Brown Barrel Shrubby Forest	46.2	37.6	16.2	2156

Map Unit Name	% Low Disturbance	% Moderate Disturbance	% High Disturbance	Total Area (ha)
9 Mount Vincent Basalt Ribbon Gum Grassy Forest	4.3	1.8	93.9	302
10 Capertee Residual Basalt Brittle Gum - Stringybark Layered Open Forest	18.7	26.2	55.2	142
11 Tableland Gully Snow Gum - Ribbon Gum Montane Grassy Forest	5.1	38.7	56.2	1584
12 Lithgow - Abercrombie Grassy Woodland	0.0	14.4	85.6	121
13 Tableland Gully Ribbon Gum - Blackwood - Apple Box Forest	25.7	46.1	28.2	859
14 Tableland Mountain Gum - Snow Gum - Daviesia Montane Open Forest	9.5	31.1	59.4	1713
15 Tableland Hollows Black Gum - Black Sally Open Forest	1.7	8.6	89.7	383
16 Capertee Limestone Hills Grey Box - Grass Tree - Spinifex Grassy Woodland	33.0	14.3	52.6	108
17 Capertee Box - Kurrajong - Grey Gum Grassy Woodlands	8.5	27.1	64.4	1532
18 Capertee Marl Box Grassy Woodlands	6.4	15.3	78.3	1140
19 Capertee Box - Narrow-leaf Ironbark - Callitris Grassy Woodland	0.8	11.6	87.6	5550
20 Capertee Rough-barked Apple - Redgum - Yellow Box Grassy Woodlands	6.8	24.7	68.5	5452
21 Capertee - Wolgan Slopes Red Box - Grey Gum - Stringybark Grassy Open Forest	36.0	45.7	18.4	8990
22 Kanangra Gorge Sheltered Grey Gum Forest	39.6	50.1	10.3	342
23 Jenolan Limestone Scrub Woodland	N/A	N/A	N/A	66
24 Montane Slopes Stringybark Forest	1.9	72.8	25.3	427
25 Montane Exposed Silvertop Ash Forest	22.5	75.7	1.8	207
26 Newnes Plateau Narrow-leaved Peppermint - Silver-top Ash Layered Open Forest	8.6	41.2	50.1	6472
27 Mount Airly Sydney Peppermint - Narrow-leaved Stringy - Grey Gum Shrubby Open Forest	100.0	0.0	0.0	0.9
28 Sandstone Plateau And Ridge Scribbly Gum - Silver-top Ash Shrubby Woodland	21.0	79.0	0.0	46
29 Sandstone Slopes Sydney Peppermint Shrubby Forest	22.4	53.1	24.5	2947
30 Exposed Blue Mountains Sydney Peppermint - Silver-top Ash Shrubby Woodland	4.4	95.6	0.0	9
31 Montane Ridge Broad-leaved Peppermint - Mountain Gum Grassy Forest	33.3	43.7	22.9	1281
32 Tableland Hills Scribbly Gum - Narrow-leaved Stringybark Shrubby Open Forest	10.6	22.3	67.1	934
33 Tableland Broad-leaved Peppermint - Brittle Gum - Red Stringybark Grassy Open Forest	2.2	44.5	53.3	1041
34 Tableland Slopes Brittle Gum - Broad-leaved Peppermint Grassy Forest	37.7	53.4	8.9	3077
35 Tableland Gully Mountain Gum - Broad-leaved Peppermint Grassy Forest	7.6	72.0	20.4	797
36 Tableland Apple Box - Bursaria Grassy Open Forest	19.2	45.2	35.7	384
37 Cox's Permian Red Stringybark - Brittle Gum Woodland	10.9	55.2	34.0	3033
38 Capertee Grey Gum - Narrow-leaved Stringybark - Scribbly Gum - Callitris - Ironbark Shrubby Open Forest	42.4	31.2	26.4	9114
39 Capertee Hills Blue-leaved Ironbark - Callitris Shrubby Forest	6.5	73.4	20.0	328
40 Capertee Slopes Red Ironbark - Red Stringybark - Narrow-leaved Stringybark Shrubby Woodland	62.4	35.0	2.6	855
41 Capertee Slopes Slaty Gum - Grey Gum - Mugga - Callitris Open Forest	21.3	46.1	32.6	2004
42 Capertee Hills White Box - Tumbledown Redgum - Ironbark - Callitris Shrubby Woodland	48.2	26.6	25.1	5913
43 Pagoda Rock Sparse Shrubland	N/A	N/A	N/A	1898

Map Unit Name	% Low Disturbance	% Moderate Disturbance	% High Disturbance	Total Area (ha)
44 Sandstone Plateaux Tea Tree - Dwarf Sheoak – Banksia Rocky Heath	75.7	8.4	16.0	1053
45 Newnes Plateau Tea Tree - Banksia - Mallee Heath	6.8	63.8	29.4	143
46 Newnes Plateau Dwarf Sheoak - Banksia Heath	14.4	30.9	54.7	247
47 Genowlan Point Dwarf Sheoak Heathland	33.8	66.2	0.0	16
48 Limestone Karst	N/A	N/A	N/A	50
49 Rock Outcrop	89.4	4.0	6.6	12
50 Newnes Plateau Shrub Swamp	58.2	28.7	13.1	394
51 Newnes Plateau Hanging Swamp	86.7	8.4	5.0	272
52 Newnes Plateau Rush - Sedge - Snow Gum Hollow Wooded Heath	76.1	23.9	0.0	45
53 Mountain Hollow Grassy Fen	0.4	13.2	86.4	97
54 Capertee - Wolgan Riparian Rough-barked Apple - River Oak Open Forest	2.3	48.4	49.3	1142
55 Tableland Riparian Scrub Complex	5.1	71.9	23.0	119
56 Wolgan Riparian Scrub Complex	0.0	0.0	100.0	42
57 Capertee Riparian Melaleuca Thickets	0.0	0.0	100.0	31
58 Acacia Thickets	0.0	0.0	100.0	411
59 Non-native Vegetation - Pine plantation / woodlot / shelter	0.0	0.0	100.0	3730
60 Non-native Vegetation - Other exotics (willow etc)	0.0	0.0	100.0	89
61 Unclassified (<1ha patch of remnant vegetation adjacent / within cleared lands)	4.0	0.4	95.6	21
62 Cleared and Severely Disturbed Lands	0.0	0.0	100.0	49708
Grand Total	14.9	21.7	63.5	136803



Map 11: Disturbance Severity Classes

4 DISCUSSION

4.1 PATTERNS IN VEGETATION COMMUNITIES

The collection of systematic field data and quantitative multivariate analysis has confirmed that patterns in the composition and distribution of vegetation communities in the study area are influenced by complex interactions between geology, soil type, topography, elevation and rainfall. Different environments distinguish the separate mapping areas, with plant species characterised by those common to either the NSW western slopes, Montane Sydney Sandstone or metamorphic substrates of the Eastern Tableland. The following sections provide an overview of how the changes in environmental characteristics result in corresponding variation in vegetation composition. The sections below represent the breakdown of the dendrogram into broad vegetation groups as described in Section 3.4 (Figure 4), with communities arranged in classes and formations in Keith (2004). Derived Map Units are also related to Tindall *et al.* (2004) as the Gurnang and Cox's mapping areas share a common boundary with that work. It should be noted that mapping boundaries will differ between projects given their study was produced at a scale of 1:100 000, which is approximately 16 times coarser than this project, executed at 1:25 000 scale. Consequently, a number of the map units described in that study have been divided when presented here.

4.1.1 Sydney Montane Dry Sclerophyll Forests

The Sydney Montane Dry Sclerophyll Forests occupy higher elevation positions (mostly above 900 metres altitude) on sandstones of the Triassic era Narrabeen sediments. These communities defined by Map Units 26, 27, 28, 29 and 30 are characterised by the distinctive sclerophyllous understorey of sandstone environments. The density of the shrub layer varies between the map units however each invariably included species of legumes (*Acacia*, *Dillwynia*, *Pultenaea*) and Proteaceae (*Hakea*, *Isopogon*, *Petrophile*, *Telopea*). This collection of communities is also united by some similarities in the canopy with silvertop ash (*Eucalyptus sieberi*) a common member. Most are likely to be referable to the Blue Mountains Ridgetop Forest of Tindall *et al.* (2004) however those associated with the highest elevations of the Newnes Plateau are less strongly associated.

Map Unit 26 describes several combinations of tree species of quite different appearance, although each share similar overall floristic composition. A low open woodland of twisted white-trunked gums (scribbly gum (*E. sclerophylla*) and brittle gum (*E. mannifera*)) grows on the shallow sandy soils of exposed slopes and crests that mark some of the higher ridges of the Newnes Plateau. The shrub layer may be sparse and the grasses (such as red-anther wallaby grass (*Joycea pallida*)) very prominent. Other forms of this Map Unit appear as denser stands of small diameter individuals of trees such as *E. sieberi,* Blue Mountains ash (*E. oreades*) and narrow-leaved peppermint (*E. radiata*). The blue-green juvenile leaves of broad-leaved peppermint (*E. dives*) are often prominent at the same height as the shrubs. This variant is also found on some of the deeper friable sandy soils of the higher plateau.

Map Units 28 and 30 represent sandstone woodlands and forests with a well-developed heath and shrub layers. The latter is typical of the forests on higher elevation Narrabeen Sandstones that underlie the capping of the Newnes Plateau itself. The gradation into Sydney peppermint (*E. piperata*) - *E. sieberi* dominated forest is apparent along many of the fire trails that extend to the outer boundary of Newnes State Forest and into Wollemi and Gardens of Stone National Parks. The distinctive *E. oreades* is no longer found in the canopy. The abundant grass layer of snow grass (*Poa*) and *Joycea* found in MU26 are not characteristic of the extensive sandstone plateau forests. Map Unit 28 is closely related to MU30 though it tends to occupy rocky sites with skeletal soils, typically at the end of long narrow ridges leading to cliff edges. The understorey may be heathy, sometimes with the mallee *E. stricta* growing amongst *E. sclerophllya* and *E. sieberi.*

Another of the montane sandstone ridgetop forests is described by Map Unit 27. This community does not equate easily with this Keith (2004) class and its position in the dendrogram reflects this difficulty. Sites that fall on Mount Airly, a residual sandstone landscape in the Capertee Valley, define Map Unit 27. While *E. piperata* is present, the narrow-leaved stringybarks (*E. sparsifolia* and *E. tenella*) also occur, as does grey gum (*E. punctata*). A shrub layer of geebung (*Persoonia linearis*) and blunt beard heath (*Leucopogon muticus*) reflect the lower elevation and rainfall experienced in this area.

Map Unit 29 falls in another part of the dendrogram that represents the sheltered aspects of montane sandstone environments, although still falls under the broad Sydney Montane Dry Sclerophyll Forest

class. This community is widespread and common across the upper Blue Mountains. The forest is generally taller than the adjoining ridgetop forests, is dominated by *E. piperita*, sometimes with brown stringybark (*E. blaxlandii*) or *E. radiata.* The ground layer often supports a high cover of bracken fern (*Pteridium esculentum*). The forest grades into Map Unit 8, a tall gully forest found in the narrow gorges. While closely related floristically as shown in the dendrogram, that map unit shares more in common with the Southern Tablelands Wet Sclerophyll Forests Class of Keith (2004).

4.1.2 Sydney Montane Heaths

Heathland Communities are common in the study area on skeletal soils in exposed areas of the Newnes Plateau, through Ben Bullen and the Mount Airly mesa to the northern end of the Capertee. These fall within the Sydney Montane Heaths of Keith (2004) and mostly are included within the Blue Mountains Heath of Tindall *et al.* (2004). There are five Map Units (43, 44, 45, 46, 47) involved in this group, with the hanging swamp unit (MU51) showing greater similarity to the heaths than to other wetlands. Four separate alliances can be identified in the analysis.

The most different of the communities from the Blue Mountains Heaths described by Tindall *et al.* (2004) is Map Unit 43. Sandstone outcropping known as 'Pagodas' dots the cliff edges of the sandstone escarpments of the Newnes Plateau, Wolgan and Capertee Valley. Map Unit 43 describes these open heath communities that grow amongst these rocks where common fringe-myrtle (*Calytrix tetragona*) and *Leucopogon muticus* are most common. Some sites feature scattered native cypress pine (*Callitris*) growing from rock cracks and crevices. Map Unit 44 is found in similar situations to Map Unit 43, although there is less pagoda outcrop and more exposed rock sheets. The form of the community is usually a matrix of moderately dense thickets of *Banksia*, tea-tree (*Leptospermum*) and dwarf sheoak (*Allocasuarina nana*) with clumps of dryland sedge (*Lepidosperma*) and carrot-bush (*Platysace*).

The third grouping consists of three Map Units (45, 46, 47). Each are united by a high abundance of *Allocasuarina nana* and *Banksia* species. The Genowlan Point Heath (MU47) on Mount Airly has been separated in the spatial presentation (map) as it is recognised as an Endangered Ecological Community (EEC) under the NSW Threatened Species Conservation Act (1995) (TSC Act 1995). However, based on site data there are minor flortistic differences between this community and those found on the Newnes Plateau. The rare mallee Wolgan snow gum (*Eucalyptus gregsoniana*) is found in MU46 above the heath layer, which can include a moderate cover of tussock graminoids like the sword-sedge (*Lepidosperma*). The lower-growing form (MU45) typically has less groundcover, but may also have some exposed rock sheets.

4.1.3 Freshwater Wetlands

There are two statewide vegetation classes of freshwater wetlands found in the study area. These are Coastal Heath Swamps (Map Units 50, 51, 52), and Montane Bogs and Fens (Map Units 52 and 53). All wetland map units occurring in the study area are recognised as EECs under the TSC Act 1995. These classes form disjunct clusters in the dendrogram.

The Newnes Plateau features elongated flat swamps along open drainage depressions. These shrub swamps (Map Unit 50) are restricted to the high elevation sandstone plateau. These swamps are periodically waterlogged. The general condition in the community is one of saturated peaty soils with a high sand content. The shrub layer is often moderately dense, and a thick groundcover dominated by sedges and rushes protects the soil surface. In some areas subject to continual overland flow this cover may be reduced in extent, but other species take advantage of the exposed soils and some (particularly the bladderworts – *Utricularia*) thrive. Many of these wetland species are also found on the shallow depressions located on the higher ridgelines of the Newnes Plateau. Here (MU52) snow gum (*E. pauciflora*) is scattered above a woody shrub layer of *Leptospermum* species.

The Hanging Swamps (MU51) found on the Newnes Plateau are also closely related to the drainage line shrub swamps (MU50). Different analyses clustered the sites with either wetland or heathland communities highlighting the similarities between the two assemblages. The community is entirely dependent on the seeping of groundwater from the sandstone strata.

The Montane Bogs and Fens (MU53) are located away from the sandstone geology, in close association with recently deposited alluvium adjoining Permian or Ordovician sediments. These are essentially wet tussock grasslands, with very few areas of woody vegetation to be found within the Map Unit.

4.1.4 Rainforests

There are two main types of rainforest community in the study area. These are recognised in Keith (2004) as Northern Warm Temperate Rainforests (MU1) and Dry Rainforests (MU2). Both are usually dominated by a single species, or a few species, and typically have a sparse shrub layer (if at all) and moderate values for the groundcover density. Emergent eucalypts sometimes tower above the rainforest canopy.

The sandstone canyon warm temperate rainforests (MU1) form tiny isolated patches in the study area. However, they have an extensive spread across the Blue Mountains. It is dominated by coachwood (*Ceratopetalum apetalum*) and sassafras (*Doryphora sassafras*). Black wattle (*Callicoma serratifolia*) and larger ferns (*Todea, Cyathea*) often make up the undergrowth.

Dry rainforests (MU2) in this area are usually dominated by a dense canopy of grey myrtle (*Backhousia myrtifolia*). At some sites a low sprawling fig (*Ficus rubiginosa*) dominates, while others include scrub beefwood (*Stenocarpus*) or prickly tea-tree (*Melaleuca styphelioides*). Dry rainforests, as the name suggests, occur in areas of lower rainfall sandstone talus, quartzite and limestone in the Capertee valley.

4.1.5 Southern Escarpment Wet Sclerophyll Forests

There are few examples of wet layered forests in the study area. Map Unit 3 is a depauperate example of such a forest. It is found on sheltered escarpment slopes and gullies usually underlain by Permian Sediments. The understorey is ferny, features a high number of wattles in the small tree layer and a mix of low growing sclerophyllous species. The community is restricted in the Hawkesbury – Nepean catchment to areas north of the Cox's River catchment.

4.1.6 Southern Tableland Wet Sclerophyll Forests

Southern Tableland Wet Sclerophyll Forests of Keith (2004) implies a tall mesic forest, however, they are more commonly tall open eucalypt forests with a herbaceous or ferny understorey. They all occur on higher elevations of the eastern tableland with rainfall exceeding 900 mm per year. Six Map Units (4, 5, 6, 7, 8, 9) fall within this Statewide Vegetation Class. The analysis clusters these Map Units into the primary substrates on which they grow, therefore they are split into different parts of the dendrogram.

Map Unit 9 has been identified from sites located outside of the study area, however the Mount Vincent Basalt Cap supports a forest that is very similar to those of adjoining basalt caps of Mount Coricudgy and Kerry Mountain. The understorey is open with herbs and ferns dominant, with a tall to very tall canopy of ribbon gum (*E. viminalis*) sometimes with blackwood (*Acacia melanoxylon*). This unit has been almost totally cleared, and few remnants exist in private hands and along very narrow road reserves. Map Units 5 and 6 are similar in height and structure although they grow on metamorphosed sediments of the central and southern tablelands. Tall forests of brown barrel (*E. fastigata*) and mountain gum (*E. dalrympleana*) are found in the gullies, while forests of *E. radiata* occupy the sheltered slopes. Both of these Map Units are closely related to the Cool Montane Wet Forests described by Tindall *et al.* (2004).

A number of the wet sclerophyll forests occur on the high elevation sandstone plateaux of Newnes and Mount Airly. Map Unit 8 is a tall forest found in the gorge and gully systems of the Newnes Plateau and features tall *E. fastigata, E. oreades,* monkey gum (*E. cypellocarpa*) and *E. piperata*. However the understorey is noticeably shrubby with sclerophyllous species shared with the surrounding sandstone forests and woodlands. Given the sandy soils, the ground cover is poor in herbaceous cover and species. Indeed, the Sydney Montane Dry Sclerophyll Forests will often grade into this unit, as illustrated by their immediate proximity in the dendrogram. Map Unit 4 represents the sheltered sandstone forests found in the most protected of the gully sites, with a very dense fern layer and an absence of shrubs such as *Leptospermum* and *Acacia* species. Both of these communities share some resemblance to the Moist Montane Sandstone Forest of Tindall *et al.* (2004).

Map Unit 7 is another tall forest found on the Newnes Plateau. This community is restricted to the highest elevations on the enriched sandstone capping of the central plateau. Tall stands *of E. blaxlandii*, *E. radiata, E. dalrympleana* and *E. oreades* are distinctive in otherwise exposed locations. The ground cover is grassy and the shrub layer is sparse and is not typical of other montane sandstone vegetation. It shares more in common with the tall forests of the metamorphosed sediments of the Jenolan and Oberon Plateau. For this reason it has been aligned to the Southern Tableland Wet Scleophyll Forests rather than the Sydney Montane Dry Sclerophyll Forests of Keith (2004). The community is likely to be restricted to the Newnes Plateau.

4.1.7 Subalpine Woodlands

There are two Map Units (14 and 15) that fall with the Subalpine Woodlands Statewide Vegetation Class. Both of these are communities dominated by snow gum (*E. pauciflora*). The first of these (MU15) occurs in frost hollows and drainage lines above 900 metres altitude. Both *E. pauciflora* and black gum (*E. aggregata*) are prominent, above a very grassy ground cover. These forests often grade into the treeless montane bogs and fens.

The second is a very dry community (MU14) with a mountain gum (*E. dalrympleana*) and snow gum (*E. pauciflora*) canopy over a grassy groundcover. A layer of shrubs may be present, and almost invariably this is dominated by broad-leaved egg-and-bacon pea (*Daviesia latifolia*). The community favours poor, stony sites in exposed positions particularly on hillcrests and on slopes.

4.1.8 Southern Tableland Grassy Woodland

The Southern Tableland Grassy Woodlands of Keith (2004) are extensively distributed across the broad plateax south from Bathurst. There are two Map Units (12 and 13) that are covered by this class, although both are closely related to the Tableland Clay Grassy Woodlands. Small areas of granite are exposed near the southern limit of the Cox's-Lithgow area, just east and south of Mount Walker. The woodlands found here (Map Unit 12) are moderately tall and dominated by *E. viminalis* and *E. pauciflora* with a dense cover of snow grasses (*Poa* sp.). Map Units 15 and 11 are both closely related in the dendrogram, although these have been allocated to the Subalpine Woodlands and Tableland Clay Grassy Woodland respectively.

In the drier western Capertee Valley, Map Unit 13 occupies narrow gullies and flats. The soils appear to mostly be fine-grained alluvium. A dense grass cover of weeping grass (*Microlaena*) and *Poa* is prominent, as are clumps of *Lomandra.* A moderately tall canopy of apple box (*E. bridgesiana*) and *E. viminalis* distinguishes the community from the surrounding ironbark and stringybark dominated dry shrubby woodlands.

4.1.9 Tableland Clay Grassy Woodland

Tableland Clay Grassy Woodlands are associated with deeper soils found on richer alluvium or basalt soils. There are two communities (Map Units 10 and 11) that are suggestive of this broader statewide community. Map Unit 11 is aligned to the Southern Tablelands Flats Forest of Tindall *et al.* (2004) and is found along creeks, flats and gullies at high elevations. The forest is dominated by *E. viminalis*, *E. dalrympleana*, *E. pauciflora* and *E. rubida* with a snow grass dominated ground cover. Smaller shrubs such as silver wattle (*Acacia dealbata*) dominate rather than the taller wattles found in Map Unit 13.

Map Unit 10 falls in the dendrogram among other grassy and herbaceous communities of the Capertee Valley. It delineates an open forest and woodland growing on the residual basalt caps of Mount Airly – Genowlan and Mount Vincent. The basalt capping is thinner in these locations, and as a result the taller forests found on Mount Vincent does not occur. Soils often show a mixed composition, with the underlying coarse Tertiary sediments exposed above Triassic sandstone and below the basalt. Consequently more deeply rooted species illustrate these influences, with trees such as *E. mannifera* and Capertee stringybark (*E. cannonii*) recorded in this community. However, the ground cover retains sufficient moisture to maintain a cover of herbs and grasses not found on the surrounding sandstone.

4.1.10 Southern Tableland Dry Sclerophyll Forests

The Southern Tableland Dry Sclerophyll Forests form a closely related group of communities in the dendrogram. These are species poor, low growing woodlands and open forests on crests and steep slopes along the Tablelands and Great Dividing Range. Map Units 31, 32, 33, 34, 35, 36, 37 comprise the communities that fall within this statewide class.

Map Units 31, 32 and 37 show close relationship to the Western Tablelands Dry Forests of Tindall *et al*. (2004). These forests are less than 20 metres in height and include a range of typical tableland eucalypts such as *E. dives*, inland scribbly gum (*E. rossii*), red stringybark (*E. macrohyncha*) and *E. mannifera.* A sclerophyllous shrub layer is usually present. However, Map Unit 32 includes several species such as sunshine wattle (*Acacia terminalis*) and *E. sparsifolia,* more common to the adjoining Triassic sandstones than the sediments of the tablelands.

Some communities within this class include a grassy ground cover, while still supporting a low growing canopy. Map Units 33, 34, 35 and 36 share these features. The first two of these map units align with the

Tableland Hills Grassy Woodland of Tindall *et al*. (2004). These are exposed grassy woodlands with a variety of tableland eucalypts mixing in the canopy, above tussocks of *Joycea pallida* and *Poa*. Map Units 35 and 36 however are grassy, semi-sheltered forests of the tableland hills and rises. Given the scale of the regional analysis, these units are likely to have been included within the broader Tableland Hills Grassy Forests of Tindall *et al.* (2004). Map Unit 35 describes the taller forests found on the sheltered slopes and gullies of Mount Walker, near Lithgow. It comprises a tall canopy of *E. dalrympleana* and a smaller tree layer of *E. dives*. A greater number of herbaceous species are found amongst the grassy ground cover than is found in the adjoining exposed Map Units of 33 and 34. Map Unit 36 is similar, though it is dominated by *E. bridgesiana* and occupies the higher and drier sites of the western Cox's Valley. The community is more extensively distributed outside of the Hawkesbury – Nepean catchment.

4.1.11 South East Dry Sclerophyll Forest

There are two Map Units (24 and 25) that fall in the higher elevations of the South East Dry Sclerophyll Class. They are associated with the montane environments of the eastern tablelands along the western fringe of the Blue Mountains reserve system. Exposed sites with stony shallow soils of both the residual Permian sediments and the Ordovician metasediments are the favoured habitat for these communities. While both map units are likely to fall within the broader forests of the Tableland Ridge Forest of Tindall *et al.* (2004) they do occupy different topographic positions and therefore are easily distinguished on the ground. Map Unit 25 is closely associated with ridges where *E. sieberi* forms a densely stocked canopy layer. Map Unit 24 mainly occurs on slopes and other semi-sheltered sites with *E. blaxlandii* replacing *E. sieberi* as the dominant tree species. The forest is generally taller and includes fewer of the shrubs typical of rocky ridgetop habitats.

4.1.12 Central Gorge Dry Sclerophyll Forests

The Central Gorge Dry Sclerophyll Forests describe the vegetation associated with the heavily dissected Wollondilly, Wingecarribee, Kowmung and the lower Cox's rivers. There are only small areas of this system found in the current study area, at the lowest elevations of the Jenolan Valley. Map Unit 22, as the community name implies, is more common across the gorges of Kanangra-Boyd National Park. It is a dry shrubby forest dominated by *E. punctata* and thin-leaved stringybark (*E. eugenioides*) and occupies very steep slopes. It forms part of the Kowmung-Wollondilly Grassy Gorge Forest of Tindall *et al.* (2004).

Both Map Units 21 and 23 do not sit easily within any of the statewide or regional vegetation mapping classifications. Both have been allocated to this statewide class based on similarities of landscape position rather than floristic similarity. Map Unit 23 is an open shrubby forest growing on the Jenolan Limestone outcrop. It is only found in this location. Map Unit 21 is however an extensive feature of the dry Permian escarpment slopes of the Wolgan and Capertee Valleys. It includes both *E. punctata* and red box (*E. polyanthemos*) as canopy dominants, in a community that resembles some habitats of the Central Gorges of the Burragorang Valley in the Warragamba catchment. Floristic analysis also suggests some minor association with Western Dry Sclerophyll Forests.

4.1.13 Eastern Riverine Forests

Eastern Riverine Forests are included within the Forested Wetlands Statewide vegetation formation of Keith (2004). There are four Map Units (54, 55, 56 and 57) that are suggestive of this broader class. The Capertee and Wolgan Valleys support significant areas of streamside vegetation. Map Unit 54 describes this community, which is dominated by a mix of river oak (*Casuarina cunninghamiana*) on the bank of the stream or river, with rough-barked apple (*Angophora floribunda*) and eucalypt species on the adjoining terraces.

The remaining Map Units of this class are highly variable scrub communities along narrow riparian strips. The variability arises from both natural flood events that occur infrequently as well as human impacts associated with land clearing. Map Unit 57 is a flax-leaved paperbark (*Melaleuca linariifolia*) dominated thicket found on the swampy alluvial fans of the Capertee Valley. The thickets are probably enlarging (certainly according to some landholders) and may be taking advantage of the sedimentation of stream channels providing a flat, well-watered environment in which they can grow.

The Wolgan River marks a complex of eucalypt forest and regenerating *Acacia* and *Leptospermum* species. Map Unit 56 describes this scrub-woodland. At higher elevations similarly structured assemblages are found along the Jenolan River and the Cox's River. Again regenerating wattles and tea

trees are commonly forming a moderately dense stand beneath an open canopy of cold-climate eucalypts such as ribbon gum (*E. viminalis*) and black sally (*E. stellulata*).

4.1.14 Western Slopes Grassy Woodlands

The Capertee Valley is situated in the far northwestern corner of the Hawkesbury – Nepean catchment and presents a unique area for plant species. This is because the climate is one of low rainfall and the environment is shaped from moderately fertile Permian Sediments and Ordvician metamorphic rocks. It is one of the few areas within the catchment that comprises vegetation typical of the western slopes, others being the Burragorang Valley and the Cumberland Plain. The Capertee Valley retains significant areas of the Statewide Vegetation Class known as Western Slopes Grassy Woodlands. Map Units 16, 17, 18, 19, 20 all fall within this class. These communities are all likely to conform to the EEC of White Box – Yellow Box – Blakely's Red Gum Woodland, listed under the TSC Act 1995 and the Grassy White Box Woodlands listed under the Commonwealth Environment Protection and Biodiversity Conservation Act (1999) (EPBC Act 1999).

Map Unit 19 describes the vegetation community that extends across the gentle rises of Permian sediments of the valley floor. Species of box tree including white box (*E. albens*), grey box (*E. moluccana*) and yellow box (*E. melliodora*) grow in combination with narrow-leaved ironbark (*E. crebra*) to form an open woodland. Small trees of *Callitris* are sometimes present. The understorey is grassy, and in most cases only a few shrubs occur, scattered through the mid-layers. This Map Unit grade into Map Unit 20 in minor depressions, gullies and flats. In these locations *Angophora floribunda, E. melliodora, E. polyanthemos* and Blakely's red gum (*E. blakelyi*) form the dominant canopy species. Clearing has heavily fragmented both of these communities and many remnants are in stages of regrowth. This may have contributed to the difficulty in separating these communities in the analyses. Additional sampling is likely to be required.

In the southern area of the valley, near to and within the Gardens of Stone National Park, there are two communities that have been mapped on limestone-influenced soils (Map Units 16 and 18). Map Unit 16 is located on limestone outcrops and presents a very distinctive community of grass trees (*Xanthorrhoea* species), spinifex (*Triodia scariosa*) and a very open canopy of *E. moluccana* / *E. albens* intergrades. Adjoining these outcrops are soils derived from shale mixed with limestone, known as marl. This produces an orange-coloured clay soil. *Eucalyptus moluccana* is typically the dominant canopy species, above a very open cover of grasses and scattered kurrajongs (*Brachychiton populneus*). Clearing has removed extensive areas of this community in the valley. It is floristically very similar to MU19, and has been separated in the analyses on the basis of the distinctive soil properties.

The footslopes of the northern escarpment of the Valley also comprise another grassy box woodland (MU17). The community appears to define a transition between Ordovician basement rocks or shale-derived Permian soils overlain by sandstone talus. The community retains a canopy of *E. albens*, though it can also include *E. punctata.* Ground cover is grassy and shrub layers sparse.

4.1.15 Western Slopes Dry Sclerophyll Forests

The dry Capertee Valley also supports western slopes plant species in the dry sclerophyll forests found on the shallow infertile soils of the western hills. These are a distinctive cluster of communities (Map Units 38, 39, 40, 41, 42) that appear together in the dendrogram, and are classified as Western Slopes Dry Sclrophyll Forests of Keith (2004). Primarily these are shrubby ironbark and cypress forests and woodlands.

One of the clear examples of the western influence is Map Unit 39. This community is typified by the blue-leaved ironbark (*E. nubila*) and *Callitris,* both being species more common on the western slopes and ranges. This forest also includes *Leucopogon muticus* as a prominent shrub species, a further link to the Brigalow Belt vegetation found on sandstone soils around Coonabarabran and Mendooran. However, a very similar shrubby forest (Map Unit 38) is far more extensive across the residual Permian hills and rises. A wide variety of eucalypts are present with *E. punctata* the most commonly recorded, and red ironbark (*E. fibrosa*) and the threatened Capertee stringybark (*E. cannonii*) also frequent.

There are several steeply incised gorges in the western hills of the Capertee Valley. These expose the underlying Devonian and Ordovician metasediments. The open shrubby woodland found here (MU42) is dominated by *E. albens,* tumbledown redgum (*E. dealbata*) and *E. crebra.* This community is tranistional between the grassy box woodlands of the valley floor (MU19 and 20) and the residual Permian Ironbark – *Callitris* (MU38 and 39). As a result, it includes many of the shrub species found in these latter map units.

Two other dry shrubby sclerophyll forests are found on the steep Permian escarpment slopes that mark the western limit boundary of Wollemi National Park. Map Unit 41 is a moderately tall forest found on the lower talus slopes. One of the dominant tree species is slaty gum (*E. dawsonii*), an endemic to the slopes and ranges of the Wollemi escarpment. Dense stands of *Callitris* are commonly found within the community, reflecting past disturbance from adjoining agricultural activities. Some sites may also feature the distinctive mugga ironbark (*E. sideroxylon*). The shrub layer is very sparse, as is the ground cover. Further upslope Map Unit 40 is more prominent, with *E. fibrosa* and *E.punctata* dominating the steeper talus slopes.

4.2 THREATENED SPECIES AND ENDANGERED ECOLOGICAL COMMUNITIES

4.2.1 Endangered Ecological Communities

EECs are recognised under both the NSW TSC Act 1995 and the Commonwealth EPBC Act 1999.

The NSW Scientific Committee have scheduled under the TSC Act 1995 a number of EECs that are relevant to the vegetation that is found in the study area. These EECs are:

- White Box-Yellow Box-Blakely's Red Gum Woodland
- Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Autralian Alps Bioregions
- Newnes Plateau Shrub Swamps
- Genowlan Point *Allocasuarina nana* Heathland

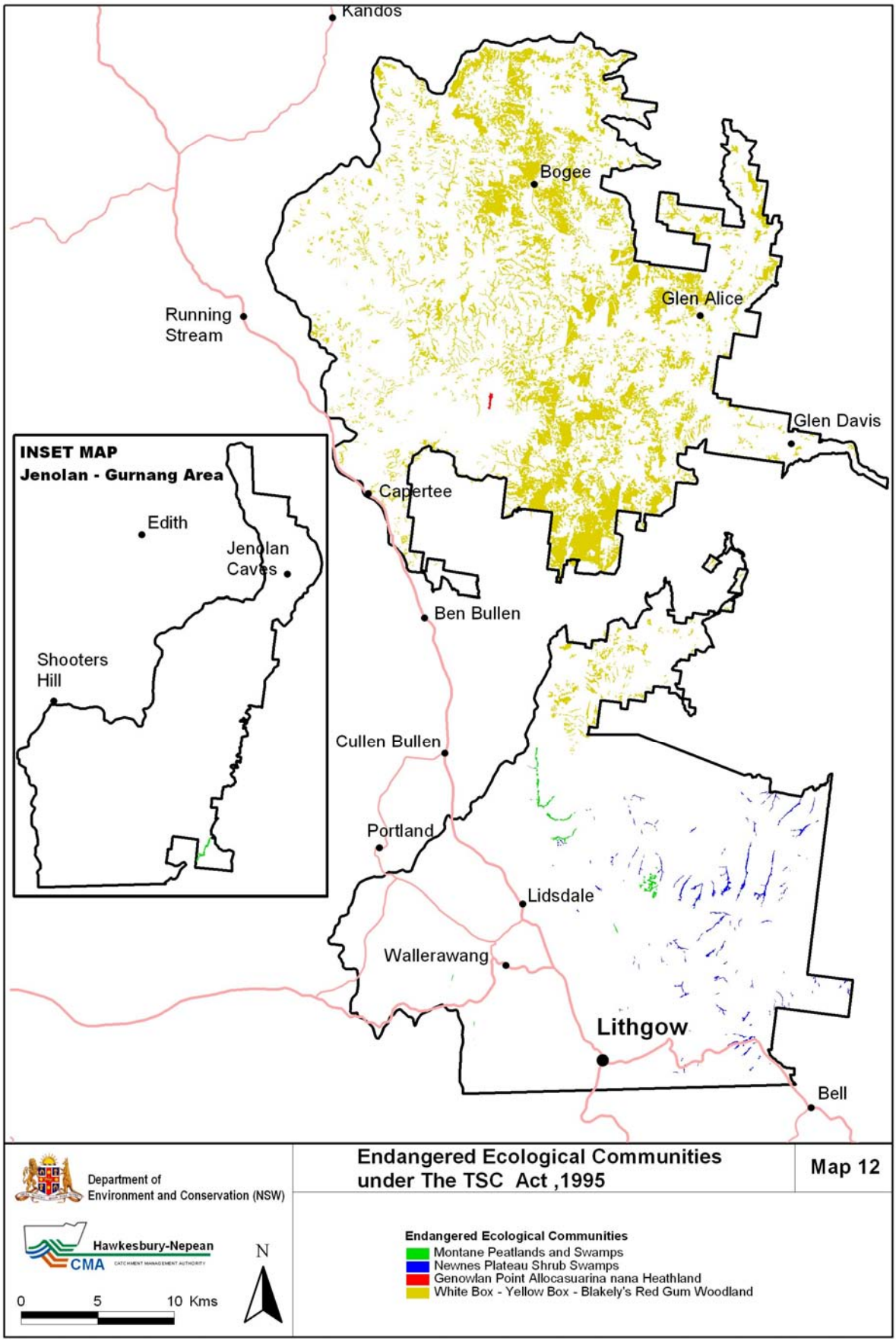
Several of these are also nationally listed EECs under the EPBC Act 1999.

- Grassy White Box Woodlands
- Temperate Highland Peat Swamps on Sandstone

The determinations that accompany these listings provide information on habitat, typical species and example locations. These were used to relate the vegetation communities defined in this report to highlight potential EECs. Tables 15 and 16 highlight the relationships between the two. Several of the EEC determinations describe broad vegetation communities that have been divided into their component parts in this report. The distribution of all EECs located within the study area is shown in Map 12.

TABLE 4.1: RELATIONSHIP BETWEEN ENDANGERED ECOLOGICAL COMMUNITIES (TSC ACT 1995) AND VEGETATION COMMUNITIES DESCRIBED IN THIS REPORT

Endangered Ecological Community Name	Corresponding Vegetation Community (This Report)
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Autralian Alps Bioregions	❑ Newnes Plateau Snow Gum Hollow Wooded Swampy Heath (MU52) ❑ Mountain Hollow Grassy Fen (MU53)
Newnes Plateau Shrub Swamps	❑ Newnes Plateau Shrub Swamps (MU50)
Genowlan Point *Allocasuarina nana* Heathland	❑ Genowlan Point Dwarf Sheoak Heathland (MU47)
White Box – Yellow Box – Blakely's Red Gum Woodland	❑ Capertee Box – Narrow-leaved Ironbark – *Callitris* Grassy Woodland (MU19) ❑ Capertee Marl Box Grassy Woodlands (MU18) ❑ Capertee Rough-barked Apple – Redgum – Yellow Box Grassy Woodlands (MU20) ❑ Capertee Limestone Hills Grey Box – Grass Tree – Spinifex Grassy Woodland (MU16) ❑ Capertee Box – Kurrajong – Grey Gum Grassy Woodlands (MU17) ❑ Lithgow - Abercrombie Grassy Woodland (MU12)



Map 12: Endangered Ecological Communities Listed under the TSC Act 1995

TABLE 4.2: RELATIONSHIP BETWEEN ENDANGERED ECOLOGICAL COMMUNITIES (EPBC ACT 1999) AND VEGETATION COMMUNITIES DESCRIBED IN THIS REPORT

Endangered Ecological Community Name	Corresponding Vegetation Community (This Report)
Temperate Highland Peat Swamps on Sandstone	❑ Newnes Plateau Shrub Swamps (MU50) ❑ Newnes Plateau Hanging Swamps (MU51) ❑ Newnes Plateau SnowGum Hollow Wooded Swampy Heath (MU52)
Grassy White Box Woodlands	❑ Capertee Box – Narrow-leaved Ironbark – *Callitris* Grassy Woodland (MU19) ❑ Capertee Marl Box Grassy Woodlands (MU18) ❑ Capertee Rough-barked Apple-Redgum-Yellow Box Grassy Woodlands (MU20) ❑ Capertee Limestone Hills Grey Box-Grassy Tree-Spinifex Grassy Woodland (MU16) ❑ Capertee Box – Kurrajong – Grey Gum Grassy Woodlands (MU17)

4.2.2 Threatened Species and Rare or Threatened Australian Plants

Records of threatened species were compiled from the Atlas of NSW Wildlife, NSW Herbarium, and all systematic survey site data. This information indicates that a total of 29 threatened species have been recorded within the study area. A further eight species listed on the Schedules of the TSC Act 1995 may occur in the area but have yet failed to be noted owing to lack of survey or timing of survey. Eighteen additional species listed by Briggs and Leigh (1995) as Rare or Threatened Australian Plants (RoTAPs) are also recorded within the study area.

Table 4.3 lists the threatened species recorded within the study area. It includes species that are listed under the TSC Act 1995 and/or RoTAP (Briggs and Leigh, 1995). Codes describing their status are as follows:

- V-Vulnerable, E1-Endangered (TSC Act 1995);
- 2 -Distribution of less than 100 kilometres, 3-Distribution greater than 100km (RoTAP);
- E-Endangered, K-Poorly Known, R-Rare, V-Vulnerable (RoTAP);
- C-Within Conservation Reserve, a-Adequately Reserved (>1000 plants), I-Inadequately Reserved (<1000 plants), "-"-Reserve level unknown, t-Total Population within Conservation Reserve (RoTAP).

A number of species in the following list (Table 4.3) are provided despite no records in the immediately surrounding area, or records in similar habitats to those found during the study but not within the study area itself. The list given has been made broad to be encompassing of species that may be in the area. Likewise, in the Map Unit profiles, the threatened species listed are given as 'definite' and 'possible' depending on the known records and expert judgement of habitat similarity.

TABLE 4.3: THREATENED SPECIES AND RARE OR THREATENED AUSTRALIAN PLANTS (ROTAPS)

Scientific Name	TSC Act	RoTAP	Known Species Habitat	Total Known Distribution	Likely Distribution Within Study Area
Acacia asparagoides	-	2R	Dry sclerophyll forest and heath on sandstone	Newnes Junction to Lawson	Newnes Junction area
Acacia clunies-rossiae[+]	V	2RC-t	Grey gum dominated open forests	Kowmung and Cox's Valleys	May occur in lowest parts of Kowmung Valley and near Jenolan
Acacia flocktoniae	V	2VC-	Narrabeen sandstones, in dry sclerophyll forest and woodlands	Mount Wilson to Picton	Newnes Plateau
Acacia matthewii	-	3RC-	Shrubby open forest of grey gum, slaty gum, ironbark and Callitris	Rylstone – Capertee to Dharug NP	Capertee Valley, esp. Glen Davis, mainly near Sir Johns Point

Scientific Name	TSC Act	RoTAP	Known Species Habitat	Total Known Distribution	Likely Distribution Within Study Area
Apatophyllum constablei	E1	2EC-	Grey gum - ironbark open forest	Glen Davis area	Green Gully
Atkinsonia ligustrina	-	2RCa	Shrubby Sydney peppermint - silvertop ash forest	Wallerawang and east through Wollemi NP	Newnes Plateau
Baloskion longipes	V	3VC-	Broad cold flats and swampy areas	South from near Mount Werong to Clyde Mountain	Montane hollow communities
Boronia deanei	V	3VCa	Wet heaths and swamp heaths	South from Newnes	Mainly in Newnes Plateau Swamp Heath
Carex klaphakei	E1	-	Riparian communities	Cox's valley / Blackheath, Mount Werong, Penrose	Cox's and Kowmung rivers
Darwinia peduncularis	V	3RCi	Rocky sandstone heaths and pagodas	Honsby to Glen Davis	Pagoda rock and sand-stone heath communities
Derwentia blakelyi	V	2K	Damper places in stream lines; soaks and seepages in montane communities	Clarence to Peel River (Bathurst) and Coricudgy Range; Tuglow	Mainly between Newnes and the upper Cox's headwaters, but also near Tuglow
Digitaria porrecta	E	3E	Grasslands on better soils	Prior to syudy, only north of the Liverpool Range	Capertee Valley – enriched soils in northern parts
Dillwynia stipulifera	-	3RCa	Swamp heath on sandstone	Lithgow district and Budawang ranges	Newnes Plateau
Discaria pubescens	-	3RCa	Grassy to shrubby woodlands and forests, often on enriched soils	Victoria to Queensland	Capertee Valley, Cox's Valley, Jenolan area
Diuris aequalis[+]	E1	3VC-	Grassy forests on tablelands and ranges	Braidwood to Kanangra and Liverpool	In montane communities south from Lithgow
Diuris tricolor (D. *sheaffiana)*[+]	V	3K	Grassy box woodlands	Western slopes of NSW south from Qld	Likely in Capertee Valley
Epacris muelleri	-	3RC-	Skeletal soils on damp rock faces	Blue Mountains and Wollemi NPs	Sandstone scarps in Newnes and eastern Capertee
Eucalyptus camphora	E1	3VC-	Cold broad flats and montane hollows	Nullo Mountain to Megalong Valley	Capertee, Cox's and Kowmung valleys
Eucalyptus cannonii	V	2VCi	Sclerophyll forests	Upper Wolgan Valley to Capertee Valley	Widespread in Wolgan and Capertee valleys
Eucalyptus gregsoniana	-	3RCa	Heath communities on sandstone	Newnes Plateau	Newnes Plateau
Eucalyptus macarthurii	V	2RCi	Cold broad flats and montane hollows	Tablelands south from Orange	Montane hollow communities in Cox's and Kowmung valleys
Eucalyptus pulverulenta	V	3V	Hillside woodlands often over granite	Bathurst – Lithgow to Bombala	Southern Mount Walker area
Eucalyptus robertsonii subsp. hemisphaerica	V	2V	Hillside grassy peppermint communities	South and east from Orange	Higher peppermint communities around Jenolan and Gurnang
Euphrasia bowdeniae	V	2VCit	Wet seeps in rocky sandstone areas	Higher Blue Mountains plateaux	Swamp heaths and hanging swamps
Euphrasia scabra	E1	3KCa	Wetter areas in Central Gorge Dry Sclerophyll Forests and Southern Tablelands Wet Sclerophyll Forests	Mainly south from Jenolan	Montane and grey gum communities in southern mapping area
Geranium graniticola	-	3RC-	Montane woodland	Oberon to Kanangra- Boyd NP	Throughout Gurnang section
Gonocarpus longifolius		3RC-	Shrub communities on sandstone and near streams	Armidale to the Blue Mountains	Throughout

Scientific Name	TSC Act	RoTAP	Known Species Habitat	Total Known Distribution	Likely Distribution Within Study Area
Goodenia macbarronii [+]	V	3VC-	Ephemeral swamps, seeps and soaks	South from Queensland	Wetter areas in dry sclerophyll forest in Capertee and Cox's valleys
Grammitis stenophylla	E1	-	Rainforests and damper places in gullies	Queensland to NSW south coast	Newnes and Wollemi gullies and gorges
Grevillea evansiana	V	2VC-	Dry sclerophyll forest on sandstone	Western Wollemi	Eastern Capertee and south to near glowworm tunnel
Grevillea obtusifolia	E1	2E	Ironbark, grey gum and stringybark forests	Pantoney's Crown to Kandos	Pantoney's Crown to Kandos on Permian strata
Haloragodendron lucasii [+]	E1	2RCat	Along and near creeks upstream of canyons	Newnes Plateau; Frenchs Forest	Eastern side of Newnes Plateau
Kunzea cambagei[+]	V	2VCa	Montane heath communities	Mount Werong and Bindook Plateau area	May be in SE corner of southern mapping area
Lastreopsis hispida	E1	-	Wet sclerophyll forest and gullies	Blue Mountains only in NSW, also Victoria	Eastern Newnes Plateau
Leionema sympetalum	V	2VC-	Rocky sandstone heaths and pagodas	Capertee Valley area	Pagoda rock and sand-stone heath communities
Leucochrysum graminifolium	-	2R	Rocky sandstone heaths and pagodas	Western Newnes Plateau to Mount Airly	Pagoda rock communities
Leucopogon fletcheri subsp. fletcheri [+]	E1	2RC-	Shrubby peppermint woodland and forest	Middle Blue Mountains	May be in sandstone woodland on eastern side of Capertee and Wolgan
Lomandra fluviatilis	-	3RCa	Streamside communities	Royal NP to Colo River	Capertee and Wolgan Rivers
Notochloe microdon	-	2RC-	Wet heaths and swamps	Elevated parts of the Blue Mountains	Newnes Plateau
Olearia quercifolia	-	3RC-	Wetter areas and soaks over sandstone	Blue Mountains	Newnes Plateau
Persoonia acerosa	-	2VC-	Heath and dry sclerophyll forest on sandstone	Central Blue Mountains to Hilltop	Elevated Sandstone plateaux
Persoonia hindii	E1	-	Dry sclerophyll forest and woodlands over sandstone	Newnes Plateau and western Wollemi	Newnes Plateau and eastern Capertee
Persoonia hirsuta	E1	3KCi	Dry sclerophyll forest, woodland and heath	Putty and Glen Davis to Hilltop	Hassan's Walls and near Glen Davis
Persoonia marginata	V	2V	Dry sclerophyll forest	Kandos to Lidsdale	Ben Bullen, Kandos and Newnes
Persoonia recedens	-	2R	Dry sclerophyll forest	Newnes to Gurnang	Newnes mapping area and Gurnang Mapping area
Phebalium bifidum	E1	2E	Shrubby ironbark forest and heath	Genowlan Point to Bogee	Genowlan Point to Bogee
Philotheca ericifolia	V	3RC-	Dry sclerophyll forests, often shrubby, in ironbark - Callitris communities, often in damper spots	Upper Hunter and Narrabri to Peak HIll	Capertee valley
Philotheca obovalis	-	3RCa	Heath	Higher Blue Mountains	Newnes Plateau
Pomaderris brunnea	V	2VC-	Streamside communities	Colo River and upper Nepean River	Capertee and Wolgan valleys
Prostanthera cryptandroides	V	2RC-t	Dry sclerophyll forests and shrubby woodlands on sandstone and talus	Glen Davis north to Warialda (northern NSW)	Glen Davis area
Prostanthera hindii	-	2KC-	Shrubland and woodland	Rylstone, Wollemi, Capertee and Newnes	Sandstone areas of Capertee and Newnes plateau

Scientific Name	TSC Act	RoTAP	Known Species Habitat	Total Known Distribution	Likely Distribution Within Study Area
Prostanthera stricta	V	2V	Shrubby woodlands and heaths on basalt soils; margins of dry rainforest on metamorphics	Mount Vincent to below eastern side of Mount Genowlan (Widden Valley populations now not this species)	Mount Vincent to below eastern side of Mount Genowlan
Pseudanthus divaricatissimus	-	3RCa	Heath and rocky sites	Far northern NSW to Victoria, at higher altitudes	Rocky heaths through-out the area, mainly on sandstone
Pultenaea glabra	V	3VCa	Dry sclerophyll forest, tall damp heath and creek lines	Glen Davis to higher Blue Mountains	Green Gully near Glen Davis and Newnes
Pultenaea sp. (Genowlan Point)	E1	-	Shrubby woodlands near cliff lines	Genowlan Point	Genowlan Point
Thesium australe[+]	V	3VCi+	Areas with much Themeda grass, including forests, woodlands and grasslands	Elevated areas from Queensland to Tasmania, but not recorded in the central tablelands	Suitable habitats (similar to those in northern NSW) observed during study

[+] Species marked with this symbol are not identified from the area, but suitable habitat and range limits suggest that the species may possibly be present, but as yet is unrecorded.

4.3 RANGE EXTENSIONS

A number of species identified during the most recent survey effort provided records of extensions of range. The list includes threatened or significant species that are known from new locations at some distance from those at which they were previously known, and species and subtaxa which are being recorded from a botanical region for the first time during this survey, when compared to the data extracted from the PlantNET website (DEC 2005). Table 4.4 provides the list of species, and the reason for their consideration. Species for which range extensions were not drawn from the surveys undertaken for this project are not included in this list. Eighty-eight native species are recorded as having range extensions. A further fifteen exotic species are also included in range extensions.

TABLE 4.4: REGIONALLY SIGNIFICANT SPECIES AND SUBTAXA

Regionally Significant Species	Reason
Abutilon oxycarpum	New record for the Central Tablelands Botanical Region
Acacia dorothea	New record for the Central Coast Botanical Region
Acacia gunnii	New record for the Central Coast Botanical Region
Acacia leiocalyx subsp. leiocalyx	New record for the Central Tablelands Botanical Region
Acianthus fornicatus	New record for the Central Tablelands Botanical Region
Amyema bifurcatum var. bifurcatum	New record for the Central Tablelands Botanical Region
Aristida caput-medusae	New record for the Central Tablelands Botanical Region
Asperula scoparia	New record for the Central Coast Botanical Region
Austrodanthonia racemosa ssp. *obtusata*	Range extension to Central Tablelands (CT) botanical region. Occurs in scattered localities in the western Capertee Valley.
Bacopa monnieri	New record for the Central Tablelands Botanical Region
Bothriochloa decipiens	New record for the Central Tablelands Botanical Region
Brunonia australis	New record for the Central Coast Botanical Region
Callitris glaucophylla	New record for the Central Tablelands Botanical Region
Calotis cuneata var. cuneata	New record for the Central Coast Botanical Region
Cassinia leptocephala	New record for the Central Tablelands Botanical Region
Centaurium spicatum	New record for the Central Tablelands Botanical Region
Chorizema parviflorum	New record for the Central Tablelands Botanical Region
Cymbopogon obtectus	New record for the Central Tablelands Botanical Region
Dendrophthoe glabrescens	New record for the Central Coast Botanical Region
Digitaria brownii	New record for the Central Tablelands Botanical Region
Digitaria divaricatissima	New record for the Central Tablelands Botanical Region

Regionally Significant Species	Reason
Digitaria porrecta	New record for the Central Tablelands Botanical Region
Dillwynia sericea	New record for the Central Coast Botanical Region
Diuris alba	New record for the Central Tablelands Botanical Region
Dodonaea sinuolata subsp. sinuolata	New record for the Central Coast Botanical Region
Echinopogon intermedius	New record for the Central Tablelands Botanical Region
Enchylaena tomentosa	New record for the Central Tablelands Botanical Region
Eucalyptus blakelyi	New record for the Central Coast Botanical Region
Eucalyptus blaxlandii	New record for the Central Coast Botanical Region
Eucalyptus crebra	New record for the Central Tablelands Botanical Region
Eucalyptus dawsonii	New record for the Central Tablelands Botanical Region
Eucalyptus macrorhyncha	New record for the Central Coast Botanical Region
Eucalyptus polyanthemos	New record for the Central Coast Botanical Region
Eucalyptus radiata	New record for the Central Coast Botanical Region
Evolvulus alsinoides ssp. *decumbens*	Range extension to Central Tablelands (CT) botanical region. Recorded from a single site but possibly more widespread. Timing of survey not ideal.
Glycine pacifica	New record for the Central Tablelands Botanical Region
Goodenia pinnatifida	New record for the Central Coast Botanical Region
Grevillea obtusifolia ssp. *fecunda*	New population of several hundred individual ramets further west of the previously known main populations.
Hibbertia vestita	New record for the Central Tablelands Botanical Region
Hovea apiculata	New record for the Central Coast Botanical Region
Hydrocotyle laxiflora	New record for the Central Coast Botanical Region
Ixiolaena leptolepis	New record for the Central Tablelands Botanical Region
Leptinella filicula	New record for the Central Tablelands Botanical Region
Leucochrysum albicans subsp. albicans var. albicans	New record for the Central Coast Botanical Region
Leucopogon fraseri	New record for the Central Coast Botanical Region
Leucopogon hookeri	New record for the Central Tablelands Botanical Region
Lomandra hystrix	New record for both Botanical Regions
Marsdenia pleiadenia	New record for the Central Tablelands Botanical Region
Marsdenia viridiflora subsp. viridiflora	New record for the Central Tablelands Botanical Region
Maytenus cunninghamii	New record for the Central Tablelands Botanical Region
Melaleuca erubescens	New record for the Central Tablelands Botanical Region
Mirbelia platylobioides	New record for the Central Coast Botanical Region
Murdannia graminea	New record for the Central Tablelands Botanical Region
Notelaea neglecta	New record for the Central Coast Botanical Region
Olearia alpicola	New record for the Central Tablelands Botanical Region
Oplismenus imbecillis	New record for the Central Tablelands Botanical Region
Opuntia stricta var. stricta	New record for the Central Tablelands Botanical Region
Paspalidium distans	New record for the Central Tablelands Botanical Region
Persoonia myrtilloides subsp. myrtilloides	New record for the Central Coast Botanical Region
Phebalium bifidum	New population found about 10km south from previous known extent. This more than triples the total known geographic range of the species.
Pittosporum revolutum	New record for the Central Tablelands Botanical Region
Plantago cunninghamii	New record for the Central Tablelands Botanical Region
Pomaderris betulina subsp. betulina	New record for the Central Coast Botanical Region
Prostanthera nivea	New record for the Central Tablelands Botanical Region
Pterostylis abrupta	New record for the Central Tablelands Botanical Region
Pterostylis concinna	New record for the Central Tablelands Botanical Region
Pterostylis grandiflora	New record for the Central Tablelands Botanical Region
Pterostylis nana	New record for the Central Tablelands Botanical Region
Pterostylis ophioglossa	New record for the Central Tablelands Botanical Region
Pultenaea canescens	New record for the Central Coast Botanical Region
Pultenaea cinerascens	New record for the Central Coast Botanical Region

Regionally Significant Species	Reason
Rapanea variabilis	New record for the Central Tablelands Botanical Region
Rhodanthe diffusa subsp. leucactina	New record for the Central Tablelands Botanical Region
Rumex dumosus	New record for the Central Tablelands Botanical Region
Sicyos australis	New record for the Central Tablelands Botanical Region
Sida cunninghamii	New record for both Botanical Regions
Sigesbeckia australiensis	New record for the Central Coast Botanical Region
Solanum stelligerum	New record for the Central Tablelands Botanical Region
Sporobolus indicus	New record for the Central Tablelands Botanical Region
Stellaria pungens	New record for the Central Coast Botanical Region
Teucrium racemosum	New record for the Central Tablelands Botanical Region
Teucrium species A	New record for the Central Tablelands Botanical Region
Trachymene scapigera	New populations found in several places, including the 'lost' likely type locality near Jenolan Cottages. Major range extension within the Kowmung and Jenolan catchments.
Triodia scariosa subsp. scariosa	New record for the Central Coast Botanical Region
Tylophora grandiflora	New record for the Central Tablelands Botanical Region
Vittadinia dissecta var. hirta	New record for the Central Tablelands Botanical Region
Vittadinia sulcata	New record for the Central Tablelands Botanical Region
Xanthorrhoea johnsonii	New record for the Central Tablelands Botanical Region
**Bidens pilosa*	New record for the Central Tablelands Botanical Region
**Carduus nutans subsp. nutans*	New record for the Central Coast Botanical Region
**Chenopodium ambrosioides*	New record for the Central Tablelands Botanical Region
**Conyza parva*	New record for the Central Tablelands Botanical Region
**Elytrigia repens*	New record for the Central Tablelands Botanical Region
**Facelis retusa*	New record for the Central Tablelands Botanical Region
**Medicago minima*	New record for the Central Tablelands Botanical Region
**Phytolacca americana*	New record for the Central Tablelands Botanical Region
**Polygala myrtifolia*	New record for the Central Tablelands Botanical Region
**Pyrus communis*	New record for the Central Tablelands Botanical Region
**Salix nigra*	New record for the Central Tablelands Botanical Region
**Salvia coccinea*	New record for the Central Tablelands Botanical Region
**Soliva sessilis*	New record for the Central Tablelands Botanical Region
**Vicia hirsuta*	Range extension within CT.
**Vulpia muralis*	New record for the Central Tablelands Botanical Region

(Data compared with DEC 2005).

4.4 A GUIDE TO FIELD IDENTIFICATION OF VEGETATION COMMUNITIES

Each vegetation community profile includes a description of key identifying features and a list of diagnostic species. The diagnostic species list is presented to guide users in the process of differentiating communities from one another or confirming the type of vegetation at a site of interest. The list of diagnostic species has been drawn from survey site data collected in this project as well as a number of previously existing survey and mapping programs. They do not represent the total list present at any given location or within any given community. The first thing to note is the number of sites that have been used to describe the community. Vegetation communities that are described using fewer sites are likely to be less accurate in the diagnostic species list than those with a high number of replicates.

The Fidelity Class column provides up to three classes for species: positive, negative and constant. A fourth type called 'uninformative' is not presented in this list but may be present in the Floristic Summary list in the profile if it is a conspicuous species or a canopy species. Table 4.3 provides an example from which to discuss the interpretation of the diagnostic species list.

TABLE 4.5: EXAMPLE DIAGNOSTIC SPECIES LIST

Species Name	Group Score	Group Freq.	Non Group Score	Non Group Freq.	Fidelity Class
Cassine australis var. australis	4	1.00	3	0.35	positive
Cayratia clematidea	2	0.55	1	0.24	positive
Croton verreauxii	3	0.82	3	0.23	positive
Diospyros australis	4	0.91	1	0.40	positive
Diospyros pentamera	1	0.09	0	0.00	positive
Doodia aspera	3	0.55	3	0.46	positive
Ficus superba var. henneana	5	0.09	0	0.00	positive
Pittosporum multiflorum	3	0.91	2	0.34	positive
Planchonella australis	4	0.73	4	0.10	positive
Streblus brunonianus	5	1.00	1	0.22	positive
Geitonoplesium cymosum	2	0.91	2	0.61	constant
Pandorea pandorana subsp. pandorana	2	1.00	2	0.61	constant
Eustrephus latifolius	1	0.91	2	0.65	negative
Livistona australis	0	0.00	2	0.52	negative
Pittosporum undulatum	1	0.82	3	0.62	negative

Group Score and Frequency: These refer to median cover abundance and the frequency at which species have been recorded at sample sites that have been used to define the community. For example in the table above it can be seen that *Croton verreauxii* occurred in 82 percent of sites and was recorded with a median cover abundance score of 5-20 percent. Cover abundance scores are provided in Section 2.4.

Non-Group Score and Frequency: These provide a comparative cover abundance and frequency of occurrence for this species in relation to all other sites not found in this community. In this example, *Croton verreauxii* has occurred in 23 percent of all other sites at a cover abundance of 5-20 percent.

Positive species are those that are recorded more frequently and at higher abundance within the given vegetation community compared to all other communities. They may also be species that are unique to that community, that is, they were not found amongst sites that defined any other community. In this example it is seen that *Cassine australis* var. *australis* occurs at 100 percent of the sites within this community at a mean cover abundance of 25-50 percent, while it occurred in only 35 percent of all other sites. It is also noted that *Ficus superba* var. *henneana* is unique to this community, and has not been recorded in any other sites (Non Group Frequency equals zero).

Negative species are the inverse of the positive species in that they are recorded less frequently and at lower abundance in the given community relative to all others. It may also be that the species has never been recorded within the sites that were used to describe the given community. In this example it is noted that *Livistona australis* has not been recorded at all in this community (Group Frequency score of zero), and that it occurs in 52 percent of sites outside this community. *Eustrephus latifolius* has also been recorded as a negative diagnostic species even though it has occurred in 91 percent of the sites within the community, though at lower cover abundance than at other sites. The Non Group scores indicate that generally this species occurs with a higher abundance elsewhere than recorded within this group so it is not an indicator species for this community.

Constant species are those that occur at relatively consistent frequency and abundance across all communities. As such they are not useful in differentiating vegetation communities but can however be useful in describing them. In this example it can be seen that *Pandorea pandorana* subsp. *pandorana* has occurred in 100 percent of sites within the community, at a mean cover abundance of two. This does not help to differentiate this community as the species was recorded in 61 percent of all other sites also with a mean cover abundance of two.

Diagnostic species are a guide only. They can be misleading in that species that appear as unique or absent from a community may result from insufficient sampling. However, with communities that have been sampled by a larger number of replicates, diagnostic species can be used to identify particular communities from one another, only if identical field survey methods are employed. Reliability of

identification will increase with the greater number of positive diagnostic species identified at a site. Confidence can also be improved with an understanding of the habitat and structural characteristics of the vegetation community of interest.

4.5 MAP ACCURACY

4.5.1 Sources of Error

This report is accompanied by a map showing the predicted distribution of vegetation communities within the study area. This map should be interpreted with regard to the limitations inherent in the methods used in its compilation. The delineation of vegetation community boundaries has relied on the allocation of API feature codes to map units, as guided by existing literature and analyses of floristic site data. It is inevitable that errors in spatial and textual information are present in the mapping coverage and users should be aware of the limitations.

The spatial or positional accuracy arises mostly from the conversion of API linework into a GIS layer. This conversion is relatively simple on flat or undulating terrain. However distortion in steep and rugged landscapes can be significant. This has generated spatial discrepancies of up to 40 metres between aerial photo layer and 1:25 000 topographic maps.

Errors may also arise during API, from misinterpretations of canopy patterns or interpretation difficulty. The latter can be assessed using the reliability code present in the digital coverage (Section 3.2, Map 11). Coding error may also arise during the data transfer process. However a number of precautionary checks are carried out to help minimise this occurrence. The reliability of the API is one method to review map accuracy. Another is to use the distribution and sampling intensity of survey site data presented in Map 10.

The derived vegetation community map relied on spatial data layers that are compiled at smaller scales. The Geology and Soil Landscape layers are available at 1:100 000 and 1:250 000 scale and may themselves contain spatial and attribution errors. This project has sought to overcome these problems by placing greater emphasis on larger scale API work than on data derived from these smaller-scaled data sets.

Other studies (Keith & Bedward 1999; NPWS 2000c) have attempted to quantify the accuracy of derived vegetation mapping for broad regions. Using the same review process both studies achieved similar levels of accuracy ranging from 70 percent accuracy within 100 metres of a known point to 80 percent within 250 metres. No attempt has been made to quantify map accuracy for this project.

Finally, vegetation community boundaries rarely change abruptly. The transition between one community and another tends to be gradual and as such a line used to separate the two can be misleading. However, despite these shortcomings qualitative field review of the mapped outputs indicate that the delineation of vegetation community boundaries is accurate at scales of 1:25 000 or larger.

4.5.2 Common Misapplications

The most common misapplication is the use of mapping products at a scale for which it has not been designed. GIS systems make it easy for users to zoom into a small area and simply overlay the vegetation map on the area of interest. Mapping linework and attribution does not hold the same accuracy at a focused area of say 1:4 000 scale as it does at 1:25 000 scale.

The attribution of the mapping work varies in accuracy across the study area. This arises from access constraints, sampling intensity and so on. Users should at least review the API confidence score and proximity of field sampling sites to judge accuracy of vegetation mapping at any given point.

4.6 USING THE MAP AND REPORT

4.6.1 PVP and Native Vegetation Management

The primary purpose of the mapping is to provide detailed vegetation mapping for on the ground applications for vegetation assessment tasks. Detailed information is provided in digital format for 1:25 000 scale assessments. Relationships with regional and statewide vegetation classes are provided for each community along with key benchmark data derived from fieldwork.

4.6.2 Fire Management

The information during this project now provides an opportunity for field data and vegetation mapping to be applied to the development of fire management plans for the study area.

- Vegetation community profiles provide an estimate of vegetation structure (height), cover and vegetation strata. Importantly, the characteristics of the vegetation associated with each community are readily accessible. Broad fuel hazard classes associated with each vegetation type can be assessed using the floristic information contained within the profiles to complete a spatial coverage for the reserves. These broad hazard classes may then be refined using site based assessments such as those promoted by McCarthy *et al*. (1999) using bark hazard, elevated fuel hazard and surface fine fuel hazard.
- Planning for hazard reduction burns can utilise the array of information captured from API. Useful features include vegetation community boundaries, presence of rock outcrops, proportion of rock within each site, understorey characteristics and tree types present. Prominent landscape features such as rainforests and heaths are easily recognised.
- Each field sample site supports at least one digital photograph. These photographs can inform users of the nature of the vegetation in the area of interest.

4.6.3 Conservation Assessment

Information provided in this report allows land managers to understand the conservation significance of different types of vegetation present within the study area. Mapping now delineates the extent of EECs at a scale of 1:25 000, the presence of endangered plant species found within each vegetation community and nominates a regional reservation status. These are relevant for the preparation of Reviews of Environmental Factors (REFs).

4.6.4 Vegetation Disturbance Assessment

Information is now available that maps indicators of disturbance to native vegetation in the study area. Data has been recorded to indicate the intensity of these disturbances to native vegetation cover. This data can be used to guide land use management practices, by highlighting areas that may require further investigation. This data may be queried to understand dominant disturbance types such as weed infestations, regrowth forests, transmission lines, and roads and trails. Remnant patches of vegetation have been mapped for areas greater than one hectare in size.

Disturbance indicators, as mapped, provide one measure of where vegetation condition may be effected. Conclusions about the condition of vegetation require close assessment of the patch of vegetation in question. Developing a detailed inventory of native species present and a review of the structural integrity of the vegetation is best achieved through a site inspection.

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APPENDIX A: FEATURE CODES, SAMPLING EFFORT AND MAP UNIT ALLOCATION

The following table outlines the allocation of Map Units (vegetation communities and other landscape features) to the feature codes developed during the API process for the Mapping Area (Section 2.8 and Map 9). Conditions for separating a feature code into multiple Map Units are provided (where used). The broad complex, dominant species and associate species are shown for each API feature code.

Codes:

- *E.* – replaces *Eucalyptus*;
- (+/-)-indicates that the species may or may not be found;
- (+?)-indicates that other species may also occur but were not known;
- Us (Understorey), Cover, Rock and Confidence refer to the polygon codes developed during the API procedure as discussed in Section 2.8 and presented in NPWS (2003b). "" refers to an uncoded polygon for that particular variable.

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
1011 COOL WARM TEMPERATE RAINFOREST										
Newnes Plateau Capertee Valley	Triassic SS	Protected gorges above 800m	Tall (open to) closed forest	1011	1	*D. sassafras, Quintinia sieberi*				4
1012 DRY RAINFOREST										
Capertee Valley	Various		Low-mid high	1012	2	Fig / *Backhousia* etc			1	39
1020 MONTANE TALL EUCALYPT FOREST associated with sheltered gullies and slopes on Triassic sandstone (*E. fastigata* / *E. cypellocarpa* / *E. dalrympleana*)										
Newnes Plateau Capertee Valley	Triassic SS / Permian slopes	Sheltered gully lines and slopes at high elevation. Occurs on deeper sandstone soils and on sandstone colluvium mantle over Permian seds	Tall to very tall, open to closed forest	1020	8	*E. fastigata, E. dalrympleana, E. blaxlandii, E. cypellocarpa*	E. *oreades, E. radiata, E piperita*		1	292
Newnes Plateau	Triassic SS / Permian slopes	Protected gorges and canyons at high elevation. Occurs on deeper sandstone soils and on sandstone colluvium mantle over Permian seds	Tall to very tall, open to closed forest	1021	8	*E. fastigata*	*E. dalrympleana, E. cypellocarpa, E. oreades, E. radiata, E. blaxlandii, E piperita*	*E. dalrympleana* sometimes codominant down slope & *E. blaxlandii* upslope, particularly under sandstone	4	630
Newnes Plateau Capertee Valley	Triassic SS / Permian slopes	Sheltered heads of gullies on deeper soils	Tall to very tall, open to closed forest	1022	4	*E. cypellocarpa, E. fastigata*	*E. dalrympleana*	Gully heads	2	49

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Newnes Plateau	Triassic SS / Permian slopes	Sheltered "cold air drainage" gully lines and slopes at high elevation.	Tall to very tall, open to closed forest	1023	8	*E. dalrympleana,*	*E. fastigata, E. piperita*	Entrenched steep-sided gullies in sandstone. 1050 used where less sheltered, less rocky and lower gradient		79
Capertee Valley (Mount Airly)	Triassic SS / Permian slopes	Sheltered heads of gullies and aspects		1024	8	*E. cypellocarpa*	*E. eugenioides*			8
		Sheltered aspects and gullies, not entrenched as 1021		1026	7	*E. fastigata, E. dalrympleana, E. blaxlandii*+ / -	*E. radiata*	Sheltered aspects, moderately inclined gullies. Not entrenched	2	437
1030	NEWNES PLATEAU MONTANE TALL EUCALYPT FOREST associated with enriched Triassic sandstone (*E. blaxlandii / E. dalrympleana / E. radiata / E. oreades*)									
Newnes Plateau	Triassic SS	Undulating slopes and rises on enriched sandstones above 1050 m. Localised patches of *E. oreades* dominant forest present	Tall to very tall, open forest	1030	26	*E. blaxlandii, E. radiata, E. dalrympleana, E. oreades*	*E. sieberi, E. mannifera* subsp. *mannifera, E. dives E. sclerophylla*	*E. piperita* rare or absent. Enriched sandstone soils, high elevation Newnes plateau	6	1941
				1030	7					
Newnes Plateau	Triassic SS	Deeper enriched soils.	Tall to very tall, open forest	1031	7	*E. oreades E. blaxlandii*+ / -	*E. radiata*, occ *E. sieberi*	*E. oreades* typically forms dominant canopy sp. Sparse dry shrubs with *Poa* sp. prominent	2	1976
Newnes Plateau	Triassic SS	Slightly sheltered broad terracing off main ridgelines.	Tall to very tall, open forest	1032	26	*E. blaxlandii, E. dalrympleana*+ / - *E. radiata*+ / - *E. sieberi*+ / -	*E. mannifera, E. dives, E. oreades*	*E. dalrympleana, E. radiata* frequently codominant but can be locally absent. Highly variable composition due to past logging. *E. oreades* can be locally codominant. Sparse dry shrubs with *Poa* sp. prominent. Tall *E. blaxlandii* and *E. dalrympleana* (when present) above a smaller tree layer	4	1524
				1032	7					

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Newnes Plateau	Triassic SS	Crests and rises where soils are shallower and rockier	Tall to very tall, open forest	1034	26	*E. sieberi, E. radiata*+ / -	*E. blaxlandii, E. mannifera, E. oreades, E. sclerophylla, E. dives*	*E. blaxlandii* absent or occ. only. *E. mannifera* oc. codominant.	1	589
1040 MONTANE TALL EUCALYPT FOREST associated with broad ridges and slopes on Triassic sandstone (*E. blaxlandii / E. oreades / E. piperita*+ / -)										
Newnes Plateau Capertee Valley	Triassic SS	Sheltered slopes and gullies	Mid high to tall, open forest	1040	29	*E. radiata, E. blaxlandii, E. piperita, E. oreades, E. sieberi*	*E. dives E. sclerophylla*	Shrubby to ferny to dense *Lomandra* sp.. *E. sparsifolia* rare or absent. Grades to 1030 group as soils become deeper and 1070 group toward edge of plateau or where soils become more sandy or shallow / rocky (e.g. toward pagoda formation)	4	1265
Newnes Plateau Capertee Valley	Triassic SS	Sheltered slopes and gullies. Variant dominated by the stringybark at heads of gullies	Tall, open forest	1041	29	*E. blaxlandii*	*E. radiata, E. dives, E. piperita, E. cypellocarpa, E. oreades*	Shruby occ. ferny	3	1586
Newnes Plateau	Triassic SS	Frequently occurring on steep slopes descending from Newnes Plateau, with E. oreades dense and dominant	Tall, open forest	1042	26	*E. oreades*	*E. radiata, E. blaxlandii, E. dives, E. piperita, E. sieberi, E. cypellocarpa*	Extends to lower limits for *E. oreades*. Overlaps with 1070. Dry shrubs occ. ferny	3	1627
Newnes Plateau	Triassic SS	Broad sandstone ridges and sheltered aspects with deeper soils.	Mid high to tall, open forest	1043	29	*E. piperita*	*E. sieberi, E. sparsifolia occ E. blaxlandii, E. oreades, E. dives*			110
Newnes Plateau	Triassic SS			1044	26	*E. blaxlandii, E. sieberi, E. radiata*+ / - *E. oreades*+ / -	*E. piperita, E. mannifera, E. dives*		1	360
1050 NEWNES PLATEAU MONTANE / SUBALPINE EUCALYPT FOREST AND WOODLANDS associated with cold hollows on Triassic sandstone (*E. mannifera / E. pauciflora / E. sclerophylla / E. dalrympleana*)										
Newnes Plateau	Triassic SS	Exposed slopes and ridges and exposed gentle depressions and frost hollows of high elevation plateau. Cold air drainage	Low to mid high, woodland to open woodland	1050	26a	*E. mannifera, E. pauciflora, E. dalrympleana, E. sclerophylla*	*E. oreades, E. dives, E. radiata*			450

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
		and sinks								
Newnes Plateau	Triassic SS	Exposed gentle depressions, frost hollows and low gradient gullies of high elevation plateau	Low to mid high, woodland to open woodland	1051	14	*E. mannifera, E. pauciflora, E. dalrympleana,*	*E. oreades, E. dives, E. sclerophylla, E. radiata*	Exposed gullies and drainage lines. Understorey varies from dense *Leptospermum* thicket to open forbs and tussock grass. 1023 used where gullies are more entrenched in sandstone	1	603
Newnes Plateau	Triassic SS	Exposed slopes and ridges. Often leading to tea tree thicket drainage lines. Soils shallow and rocky	Low to mid high, woodland to open woodland	1052	26a	*E. E. mannifera E. sclerophylla*	*E. dives, E. oreades, E. pauciflora, E. dalrympleana, E. radiata. (E. piperita+ / -)*	Shrubby includes *B. spinulosa, A.nana.* Mallees oc present (*E. gregsoniana, E. multicaulis*) *E. piperita* occ present to east	1	586
Newnes Plateau	Triassic SS	Exposed slopes and ridges		1053	52	*E. pauciflora*	*E. mannifera, E. dalrympleana*		2	71
				1053	14					
Newnes Plateau	Triassic SS	Exposed slopes and ridges.		1055	26a	*E. sclerophylla, E. dalrympleana*	*E. oreades, E. dives*			231
Newnes Plateau	Triassic SS	Exposed slopes and ridges. Often leading to Tea-tree thicket drainage lines. Soils shallow and rocky.		1056	26a	*E. mannifera, E. dives+ / - E. oreades + / - E. sieberi+ / -*	*E. sclerophylla, E. pauciflora*	*E. dives* sometimes assoc only	2	268
1070	MONTANE DRY EUCALYPT FOREST AND WOODLANDS associated with ridges on Triassic sandstone (*E. piperita / E. sieberi / E. sclerophylla* usually present; *E. blaxlandii / E. radiata* rare or absent)									
Newnes Plateau Capertee Valley	Triassic SS	Exposed slopes and ridges.	Mid high to tall, woodland to open forest	1070	32	*E. piperita, E. sieberi, E. sclerophylla, E. sparsifolia, A.littoralis (local)*	*E. mannifera, E. oreades* (at lower limits),	*E. blaxlandii / E. radiata* rare or absent. High elevation sandstones. Near limit of *E. oreades.* Low shrubs to heathy. *E. punctata* essentially absent on Triassic sandstone.	7	1926
				1070	30					

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Newnes Plateau	Triassic SS	Exposed upper slopes and ridge tops. Often swarming post fire regrowth on narrow ridgelines. Low thin diameter trees	Mid high to tall, open forest	1071	30	*E. sieberi, E. piperita*+ / -	*E. sparsifolia*	*E. piperita* sometimes assoc. shrubby	1	1019
Newnes Plateau	Triassic SS	commonly occurring on exposed rocky ends of ridgelines leading to heathland or escarpment cliffs	Low to tall, woodland to open woodland	1073	28	*E. sclerophylla*	*E. sieberi, E. piperita, E. sparsifolia, E. oreades*	Shrubby to heathy with *L.. trinervium*, *B. spinulosa* etc. *E. piperita* occ. co-dominant.	4	1955
Newnes Plateau	Triassic SS		Mid high to tall, woodland to open forest	1074	28	*E. sieberi, E. sclerophylla*	*E. piperita, E. mannifera, E. dives, E. radiata, E. oreades*	Common on ridges adjacent to highway leading into Lithgow, *E. oreades* at lower limits	1	124
Newnes Plateau Capertee Valley	Triassic SS	Exposed upper slopes and ridge tops	Mid high to tall, woodland to open forest	1075	30	*E. piperita, E. sparsifolia, E. sieberi*+ / -	*E. sclerophylla, E. punctata*	*E. sparsifolia* sometimes assoc. only	3	2826
Newnes Plateau	Triassic SS	Exposed upper slope	Low to tall, open forest	1076	30	*A.littoralis*			1	7
Coxs Valley (Ben Bullen SF Nth)	Triassic SS	Exposed upper slopes and broad ridge tops	Low to tall, woodland to open forest	1077	32	*E. sclerophylla, E. sparsifolia, E. sieberi,*	*E. macrorhyncha / E. cannonii, E. mannifera, E. dives, E. punctata*	*E. sclerophylla, E. sparsifolia, E. sieberi*+ / - predominant on broad ridge tops and Permian slopes. Spp. occ. present near edges grading to 1120.	2	477
Coxs, Wolgan Valleys	Permian shales + sandstone colluvium	Edges of Triassic sandstone and escarpment upper slopes. Common as a community occurring on sandstone colluvium over upper Permian sediments (below cliff faces)	Mid high to tall, woodland to open forest	1079	27	*E. piperita, E. sieberi, E. punctata*	*E. macrorhyncha / E. cannonii, E. rossii*		6	2021
				1079	30			Split for floristic assemblage		
1100	TALL EUCALYPT FOREST associated with semi-sheltered Permian talus slopes (*E. punctata*)									

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Wolgan / Capertee Valleys	Permian	Sheltered slopes and gullies of escarpment slopes	Tall to very tall open forest	1100	3	*E. cypellocarpa, E. punctata, A.floribunda, E. eugenioides, E. sparsifolia, E. blaxlandii, E. viminalis*	*E. melliodora E. polyanthemos, E. blakelyi, E. fastigata*	Shrubby and ferny	2	836
Wolgan / Capertee Valleys	Permian	Sheltered slopes and gullies of escarpment slopes	Tall to very tall open forest	1101	3	*E. cypellocarpa, E. punctata, A.floribunda*	*E. eugenioides, E. melliodora, E. fastigata, E. polyanthemos*	Shrubby and ferny. Moist.	4	548
Wolgan Valley	Permian + sandstone / shale colluvium	Sheltered slopes and gullies of escarpment slopes occupying colluvial benches resulting from mass movement (slumping)	Tall to very tall open forest	1102	3	*A.floribunda, E. eugenioides, E. punctata*	*E. viminalis, E. melliodora*	Moist to intermediate.	1	104
Capertee Valley	Permian	Sheltered to semi-sheltered escarpment slopes	Tall to very tall open forest	1103	3	*E. punctata, A. floribunda*	*E. blakelyi, E. melliodora*	Downstream from Glen Davis	3	434
Capertee Valley	Permian	Sheltered to semi-sheltered escarpment slopes	Tall to very tall open forest	1104	3	*E. punctata, E. sparsifolia / E. cannonii, E. melliodora*	*E. polyanthemos,*	Intermediate-dry. Less dry than 1146. *E. melliodora* occ. assoc. only.		339.3
Capertee Valley	Permian	Sheltered to semi-sheltered escarpment slopes. Probably on colluvium	Tall to very tall open forest	1105	3	*E. punctata, E. blaxlandii*	*E. cannonii*	Intermediate-dry.	1	274
	Permian + sandstone / shale colluvium	Sheltered slopes and gullies of escarpment slopes on Triassic sandstone colluvium	Tall to very tall open forest	1106	3	*E. sieberi, E. blaxlandii, E. piperita, E. punctata*	*E. cypellocarpa, E. oreades* (Cox's Valley), *E. melliodora, E. polyanthemos*		1	156
1140 DRY EUCALYPT FOREST associated with Permian talus slopes (*E. punctata / E. polyanthemos*)										
Wolgan / Capertee Valleys	Permian	Dry escarpment slopes on Permian sediments below Triassic sandstone	Mid high to tall open forest	1140	21	*E. punctata, E. macrorhyncha / E. cannonii / sparsifolia, E. polyanthemos, E. melliodora, E. fibrosa, E. rossii, E. albens*	*A.floribunda, E. blakelyi, E. crebra, Callitris* spp.	*E. polyanthemos, E. albens , E. melliodora, E. fibrosa* common only in Capertee and Wolgan Valleys	2	2320

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Capertee Valley	Permian	Dry escarpment slopes on Permian sediments below Triassic sandstone	Mid high to tall woodland to open forest	1141	40	*E. fibrosa*	*E. punctata, E. macrorhyncha / E. cannonii, E. rossii, E. polyanthemos, E. melliodora*		2	856
Capertee Valley	Permian	Dry escarpment slopes on Permian sediments below Triassic sandstone	Mid high to tall woodland to open forest	1143	32	*E. punctata, E. rossii, E. sparsifolia*	*E. melliodora, E. polyanthemos, E. mannifera, E. dives*	Drier, generally more open than 1146. Higher elevation > 800m occ. *E. mannifera* and *E. dives* on upper slopes / ridge top. *E. rossii* can be locally dominant in drier areas	1	74
				1143	21					
Capertee Valley	Permian	Dry escarpment slopes on Permian sediments below Triassic sandstone	Mid high to tall woodland to open forest	1144	38	*E. punctata, E. fibrosa*	*E. crebra, E. sparsifolia, Callitris*		10	1529
				1144	41					
Capertee Valley, Wolgan Valley	Permian	Dry escarpment slopes on Permian sediments below Triassic sandstone	Mid high to tall woodland to open forest	1146	21	*E. punctata, E. sparsifolia / E. cannonii, E. polyanthemos*	*E. melliodora, E. rossii, E. albens*	*E. polyanthemos* varies, sometimes dominant / codominant and sometimes assoc. Grades into 1161 and 1163. More dry than 1104. Similar to 1594 but SS above and *E. punctata* present in 1146	11	2588
		Occurs at change of grade. Grades to Shoalhaven grp?		1148	21	*E. polyanthemos, E. blakelyi, E. melliodora*	*E. punctata, E. cannonii*	Commonly occurs below 1146, Grades into 1595. *E. blakelyi* usually present	1	197
1160	CAPERTEE DRY EUCALYPT FOREST associated with lower Permian sediment ridges (*E. punctata / E. sparsifolia / E. tenella*)									
Wolgan / Capertee Valleys	Lower Permian sediments (conglomerate?)	Ridges (on Permian conglomerate?) extending from steeper Permian slopes grading to Devonian metasediments	Mid high to tall woodland to open forest	1160	38	*E. punctata, E. sparsifolia / E. tenella, E. macrorhyncha / E. cannonii, E. crebra / fibrosa, E. rossii, Callitris, E. nubila*	*E. polyanthemos, E. melliodora, E. moluccana / E. albens, E. albens, E. dealbata+ / -*	Ridge tops and upper slopes. Fine leaved stringy (*E. tenella*?) and *E. punctata* typically present.	2	2394

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Wolgan and Capertee Valleys	Lower Permian sediments (conglomerate?)	Ridges on lower Permian sediments (conglomerate?) extending from steeper Permian slopes grading to Devonian metasediments	Mid high to tall woodland to open forest	1161	38	*E. punctata, E. sparsifolia / E. tenella?, E. macrorhyncha / E. cannonii+ / - E. crebra / fibrosa+ / -*	*E. melliodora, E. moluccana / E. albens, E. polyanthemos, E. albens, E. rossii, Callitris*	Fine canopy texture. Ironbark is usually *E. crebra*. *E. rossii* occ. codominant or locally dominant in places.	4	1461
Wolgan and Capertee Valleys	Lower Permian sediments (conglomerate?)	Ridges on lower Permian sediments (conglomerate?) extending from steeper Permian slopes grading to Devonian metasediments	Mid high to tall woodland to open forest	1162	38	*E. punctata, E. crebra*	*E. tenella*	Fine canopy texture, occurring on ridge tops		9
Wolgan and Capertee Valleys	Lower Permian sediments (conglomerate?)	Ridges on lower Permian sediments (conglomerate?) extending from steeper Permian slopes grading to Devonian metasediments	Mid high to tall woodland to open forest	1164	38	*E. fibrosa*	*E. punctata, E. tenella, E. polyanthemos*	Fine canopy texture, localised on ridge tops. Tends to occur toward ends of ridges that drop into steep gullies or gorges. Perhaps part of 1593 or 1596?	1	47
Wolgan and Capertee Valleys	Lower Permian sediments (conglomerate?)	Ridges on lower Permian sediments (conglomerate?) extending from steeper Permian slopes grading to Devonian metasediments	Mid high to tall woodland to open forest	1165	38	*E. rossii*	*E. tenella, E. macrorhyncha / E. cannonii*	Very dry open patches	1	18
Wolgan and Capertee Valleys	Lower Permian sediments (conglomerate?)	Ridges on lower Permian sediments (conglomerate?) extending from steeper Permian slopes grading to Devonian metasediments	Mid high to tall woodland to open forest	1166	38	*E. punctata, E. sparsifolia / E. tenella?,Callitris*		On ridge tops, usually small crowns occurring within 1161	2	701
Capertee Valleys	Lower Permian sediments (conglomerate?)	Ridges on lower Permian sediments (conglomerate?) extending from steeper Permian slopes grading to Devonian metaseds	Mid high to tall woodland to open forest	1167	39	*E. nubila, E. fibrosa / crebra, Callitris+ / -*	*E. albens, E. dealbata, E. moluccana, E. punctata*		4	338

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Capertee Valley	Lower Permian sediments (conglomerate?)	Transitional geology. Steep lower Permian side slopes grading to Devonian metasediments. Alt > 500m at W side of valley	Low to mid high woodland to open forest	1168	38	*E. albens, E. punctata*+ / - *E. crebra / fibrosa*+ / -	*Callitris, E. melliodora, E. dealbata* (local)	Transitional wbx type. Similar to 1593 but transitional Permian grading to Devonian metasediments (1593=Permian only) Transitional with 1271 but *E. punctata* present. 1180 grp used if *E. punctata* is unlikely and *E. dealbata* is more abundant (steep dry open and *Callitris* present)	4	2013
1170 TALL OPEN EUCALYPT FOREST associated with Permian sediment gullies (Box - Gum Species)										
Wolgan and Capertee Valleys	Permian grading to Devonian	Gullies draining from Permian escarpment foot slopes on Permian sediments	Mid high to tall woodland to open forest	1170	21	*E. blakelyi, E. melliodora, E. bridgesiana, E. viminalis, E. sparsifolia, E. punctata*	E. cannonii, E. polyanthemos			355
Capertee Valley	Permian grading to Devonian	Gullies draining from Permian escarpment foot slopes on Permian sediments	Tall to very tall open forest	1172	13	*E. viminalis, E. bridgesiana, E. blakelyii, E. melliodora*	E. polyanthemos, A.floribunda		3	832.5
Capertee Valley	Permian grading to Devonian	Major gullies draining from Permian escarpment foot slopes	Tall to very tall open forest	1173	13	*E. viminalis*		Perhaps merge with 1172. Both alluvial and intermediate-moist	1	31
Capertee Valley	Permian grading to Devonian	Gullies draining from Permian escarpment foot slopes on Permian sediments	Tall to very tall open forest	1174	20	*E. blakelyii, E. melliodora, E. bridgesiana* + / -, *E. punctata*+ / -	*E. albens, A.floribunda, E. viminalis*		6	1686
Capertee Valley	Permian grading to Devonian	Sheltered to semi-sheltered escarpment and foot slope gullies. Extends well down slope to metaseds	Tall to very tall open forest	1175	21	*E. viminalis, E. punctata, E. sparsifolia* (NS)	*E. blaxlandii, E. blakelyi, E. bridgesiana*	Needs sampling. ?Mudgee R12 / 38.		200
Capertee Valley	Permian grading to Devonian	Mount Airly. Sheltered side slopes and gullies		1176	3	*E. viminalis, E. cypellocarpa*				17

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Capertee Valley	Permian grading to Devonian	Sheltered to semi-sheltered escarpment and foot slope gullies.		1177	41	*E. punctata* dominant	*E. blakelyii, E. melliodora, E. crebra / fibrosa*			21
1180	DRY EUCALYPT AND PINE WOODLANDS associated with Permian / Devonian complex ridges and gorges (*E. albens / E. dealbata / C. endlicheri*)									
Capertee Valley	Devonian	Steep and exposed (Devonian?) side slopes	Low to mid high woodland to open forest	1180	42	*E. dealbata, E. albens, C. endlicheri, E. crebra+ / -*	*B. populneus, E. fibrosa, E. cannonii, E. moluccana*	Grades into 1271		559
Capertee Valley	Devonian	Steep and exposed (Devonian?) side slopes	Low to high woodland to open forest	1181	42	*E. albens*	*E. dealbata E. crebra / fibrosa, Callitris, E. moluccana*	*E. albens* dominant. Use 1271 for valley ridges / side slopes and undulating rises. If *E. punctata* likely and less exposed use 1593	3	1440
Capertee Valley	Devonian	Exposed (Devonian?) dry ridge tops and side slopes	Low to mid high woodland to open forest	1182	42	*E. albens C. endlicheri, E. dealbata+ / -, E. crebra+ / -*	*E. cannonii, B. populneus*	Use if *Callitris* abundant and *E. dealbata* present. If taller site height and *E. dealbata* not abundant consider 1271. If *E. punctata* likely use 1592.	5	3883
	Devonian	Steep and exposed (Devonian?) side slopes	Low to mid high woodland to open forest	1183	42	*E. dealbata, E. crebra*	*C. endlicheri*	Locally observed at 'Watervale'		48
1190	MT WALKER SHELTERED TALL EUCALYPT FOREST associated with Devonian metasediments (*E. fastigata / E. viminalis*)									
Coxs Valley (Mount Walker)	Devonian	Sheltered aspects, gullies	Tall to very tall, open forest	1190	34	*E. viminalis, E. fastigata, E. dives*	*E. dalrympleana, E. pauciflora*			11
				1190	4					
Coxs Valley (Mount Walker)	Devonian	Sheltered aspects, gullies	Tall to very tall, open forest	1191	34	*E. viminalis, E. dives*	*E. dalrympleana, E. pauciflora*		3	132
Coxs Valley (Mount Walker)	Devonian	Sheltered aspects, gullies	Tall to very tall, open forest	1192	4	*E. fastigata,*	*E. dalrympleana, E. pauciflora*		1	17
1200	MT VINCENT TALL OPEN EUCALYPT FOREST associated with Tertiary basalt capping (*E. viminalis*)									
Capertee Valley	Tertiary Basalt	Basalt cap	Tall to very tall, open forest	1200	9	*E. viminalis*	*E. pauciflora*			302
1230	COX VALLEY DRY EUCALYPT WOODLANDS associated with Permian / Devonian ridges (*E. rossii / E. mannifera*)									

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Coxs Valley (Lidsdale - Mount Walker)	Permian / Devonian	Dry slopes and ridge tops	mid high to tall, woodland to open forest	1230	34	*E. rossii, E. mannifera, E. dives, E. bridgesiana, E. sieberi* (local)	*E. melliodora, E. pauciflora, E. dalrympleana, E. rubida, E. macrorhyncha / E. cannonii,*	General <1000. *E. sieberi* localised occurrences)	1	1273
Coxs Valley (Lidsdale - Mount Walker)	Permian / Devonian	Dry slopes and ridge tops	mid high to tall, woodland to open forest	1231	34	*E. rossii, E. mannifera, E. dives*	*E. bridgesiana, E. melliodora*	*E. bridgesiana* may be locally codominant in less exposed sites. In mores exposed sites *E. rossii* typically dominates	7	1690
Coxs Valley Mount Walker	Devonian	Exposed upper slopes and ridge tops	Tall, open forest	1236	34	*E. sieberi*	*E. rossii, E. mannifera, E. sparsifolia*		1	21
1240	COX VALLEY DRY EUCALYPT FOREST associated with partly sheltered slopes and minor watercourses (*E. dives / E. bridgesiana*)									
Coxs valley (Cox Riv / Falnash)	Permian	Minor watercourses, Dry partly sheltered slopes and gullies	Very tall woodland to open forest	1240	36	*E. viminalis, E. bridgesiana, E. melliodora, E. dives, E. mannifera. E. dalrympleana*	*E. blakelyi*			238
Coxs Valley (Lidsdale - Mount Walker)	Permian / Devonian	Dry partly sheltered slopes and gullies	mid high to tall, woodland to open forest	1241	36	*E. dives, E. bridgesiana,*	*E. rossii, E. mannifera*		2	79
Coxs Valley (Lidsdale - Mount Walker)	Permian / Devonian	Dry partly sheltered slopes and gullies	mid high to tall, woodland to open forest	1242	36	*E. melliodora, E. mannifera E. bridgesiana*	*E. rossii, E. dives*		1	66
Coxs Valley	Permian	Dry partly sheltered slopes and gullies	Tall woodland / forest	1243	35	*E. dalrympleana, E. dives*	*E. mannifera, E. macrorhyncha / E. cannonii, E. rossii, E. pauciflora*		1	297
1250	COX VALLEY EUCALYPT WOODLANDS associated with high elevation ridges (*E. rubida / E. dalrympleana*)									
Coxs Valley	Permian	Valley floor remnants on gently undulating slopes and rises. Highly modified lands (cleared / semi-cleared for grazing),	Tall to very tall woodland to open forest	1250	12	*E. rubida, E. dalrympleana E. pauciflora, E. viminalis, E. dives, E. mannifera*	*E. rossii, E. bridgesiana*	Mostly > 900	5	557.8

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				1250	33					
Coxs Valley (Falnash)	Permian / Devonian	Dry slopes and ridge tops	Mid high to tall, woodland to open forest	1251	33	*E. dives, E. mannifera*	*E. rossii, E. rubida, E. melliodora, E. bridgesiana, E. pauciflora, E. dalrympleana*		2	538
1270 CAPERTEE GRASSY EUCALYPT WOODLANDS associated with low elevation slopes and rises (*E. albens / E. melliodora / E. moluccana*)										
Capertee Valley	Permian / Devonian	Valley floor remnants on gently undulating slopes rises and low gradient drainage lines. Typically lands highly modified (cleared / semi-cleared for grazing),	Tall to very tall woodland to open forest	1270	19	*E. melliodora, E. moluccana, E. albens, E. blakelyi, A.floribunda, E. crebra*	*B. populneus, Callitris*			1080
Capertee Valley	Permian / Devonian	Valley floor remnants on gently undulating slopes / rises and residual ridges. On highly modified lands some elements removed leaving box / ironbark woodland / open woodland. Ironbark and Callitris more abund on rises. East of Mount Airly.	Tall to very tall woodland to open forest	1271	19	*E. albens, E. melliodora, E. moluccana, E. crebra+ / -, Callitris+ / -*	*E. blakelyi, B.populneus, A.floribunda, E. dealbata+ / -*	Various combinations due to clearing / fragmentation. *E. albens* typically dominant or codominant, particularly in paddock / pasture improved areas (eg csr>4 and disturb=29). *E. crebra*, *Callitris* sometimes absent or v sparse in 'pasture improved lands'. Common on residual Permian rises / ridges in E part of valley. Grades into drier 1180 *E. dealbata* grp. *E. melliodora* locally dominant or codominant. Grades into 1180 grp and 1593.	3	4322

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Wolgan / Capertee valleys	Permian / Devonian	Valley floor remnants occupying low gradient slopes and drainage lines. Highly modified lands (cleared / semi-cleared for grazing),	Tall to very tall woodland to open forest	1275	19	*E. moluccana*	*E. blakelyi*		2	157
Wolgan / Capertee valleys	Permian / Devonian	Gullies and side slopes adjacent watercourses		1277	20	*A.floribunda*	*E. albens, E. moluccana, E. crebra, Callitris*			121
1274	CAPERTEE GRASSY EUCALYPT WOODLANDS associated with low gradient watercourses (*E. blakelyi / E. melliodora / A.floribunda*)									
Wolgan / Capertee valleys	Permian / Devonian	Valley floor remnants typically occupying deeper more moist soils on low gradient slopes and drainage lines. Also occurs on streamside slopes.	Tall to very tall woodland to open forest	1274	20	*E. melliodora, E. blakelyi, A.floribunda+ / -*	*E. albens, E. moluccana, E. viminalis, E. crebra, E. bridgesiana*	*E. melliodora* sometimes dominant in highly modified lands. *E. sideroxylon* occasionally present on adjacent foot slopes.	3	3691
1280	CAPERTEE GRASSY EUCALYPT WOODLANDS associated with limestone / marl (*E. moluccana / E. albens*)									
Capertee Valley	Limestone / marl	Foot slopes, intermittent linear limestone / marl outcrops	Mid high to tall woodland to open forest	1280	16	*E. moluccana, Xanthorrhoea*	*E. crebra, B. populneus, Callitris*	Grassy (Spinifex sometimes present)		52
Capertee Valley	Limestone / marl	Foot slopes, intermittent linear limestone / marl outcrops	Mid high to tall woodland to open forest	1281	16	*Xanthorrhoea*	*E. moluccana, B. populneus*	Grassy (Spinifex sometimes present)	2	57
Capertee Valley	Limestone / marl	Foot slopes, intermittent linear limestone / marl outcrops	Mid high to tall woodland to open forest	1282	18	*E. moluccana*	*Xanthorrhoea, E. crebra, B. populneus, Callitris*	Grassy (Spinifex sometimes present)	2	741
Capertee Valley	Limestone / marl	SE part of Capertee Valley		1283	18	*E. moluccana, E. crebra*	*Callitris,* Stringybark *(E. sparsifolia?), A.floribunda*	Not sure if marl. Intergrade with residual Permian ridges? Perhaps reclass as 1599?	1	415.7
1300	TALL RIPARIAN FOREST (*E. viminalis / Casuarina cunninghamiana*)									
Coxs / Wolgan / Capertee valleys	Permian? / Devonian	Coxs, Wolgan, Capertee Rivers and major tributaries	Very tall closed to open forest	1300	54	*E. viminalis, A.floribunda, C.cunninghamiana, E.*	*E. tereticornis, E. melliodora,* Stringybark *(E. eugenioides?)*		1	406

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						blakelyi, E. bridgesiana				
Coxs / Wolgan / Capertee valleys	Permian? / Devonian	Coxs, Wolgan, Capertee Rivers and major tributaries	Very tall closed to open forest	1301	54	*E. viminalis*+ / -, *A.floribunda, E. blakelyi, E. bridgesiana*	*C.cunninghamiana, E. melliodora*		1	296
				1301	54					
Coxs / Wolgan / Capertee valleys	Permian? / Devonian	Major tributaries	Very tall closed to open forest	1302	56	*E. viminalis*+ / -*A. floribunda, C. cunninghamiana*	*E. blakelyi*	Similar to 1274 but stream more developed and carries *E. viminalis*	5	588
				1302	54					
Wolgan River				1303	56	*E. viminalis, E. eugenioides*	*E. blakelyi, E. melliodora*			27
				1304	55	*E. viminalis, E. bridgesiana, E. dalrympleana, C. cunninghamiana*	*E. pauciflora, E. stellulata*	Cox Valley SW of Mount Walker	1	54
1320	MONTANE MALLEE COMPLEX associated with Triassic sandstone									
Newnes Plateau	Triassic SS	very exposed broad flat crests shallow soil, above 1100. Grades into tree mallee in places	Tall to very tall mallee woodland to open mallee woodland	1320	45	*E. stricta, E. multicaulis, E. apiculata, B.spinulosa*	*E. pauciflora. E. dalrympleana, A.nana*	Open sedgy undetorey, dry heath	2	98
Newnes Plateau	Triassic SS	very exposed broad flat crests shallow soil, above 1100. Grades into tree mallee in places	Tall to very tall mallee woodland to open mallee woodland	1321	45	*E. stricta, E. multicaulis,*	*E. mannifera*		1	45
1330	MONTANE HEATHLAND COMPLEX associated with Triassic sandstone									
Newnes Plateau	Triassic SS	Extensive heath. Exposed skeletal soils	Mid high to tall heathland to open heathland	1330	46	*B.ericifolia, A. nana, Hakea teretifolia, E. apiculata*	Mallees, *E. mannifera, E. sclerophylla*		1	495
				1330	44					
Newnes Plateau	Triassic SS	Skeletal soils on exposed aspects. Extensive A.nana heath typically dominates or codominant.	Mid high to tall heathland to open heathland	1331	44	*A. nana*	Mallees, *E. mannifera, E. sclerophylla*	Soils skeletal. Exposed rock not extensive,	1	92
				1331	47					

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Newnes Plateau	Triassic SS	Exposed rock terraces. Commonly associated with 1340 and 1350	Mid high to tall heathland to open heathland	1332	44	*A. nana, Hakea teretifolia, Banksia ericifolia*	*E. apiculata*	Exposed rock terraces	4	910.6
1340	MONTANE ROCK COMPLEX associated with Triassic sandstone									
Newnes Plateau	Triassic SS	Rock complex that includes various growth forms (not feasible to map as discrete units).	Rock complex	1340	44	*Callitris rhomboidea, Allocasuarina* spp., *Leptospermum* spp., *Hakea teretifolia*, etc	*E. sclerophylla*	Rock outcrops near pagodas	2	787
				1340	29					
1350	ROCKLAND									
		Rockland (>75% rock)		1350	43	Rock		Typically <10 veg cover.		105
Newnes Plateau	Triassic SS	Essentially sandstone pagoda rock formation		1351	43	Rock			4	1797
1360	NEWNES PLATEAU MONTANE GULLY SWAMP-HEATH COMPLEX associated with Triassic sandstone									
Newnes Plateau	Triassic SS	Drainage line habitat. Low gradient, impeded drainage	Tall to very tall shrubland	1360	50	*L. obovatum, B. spinulosa*		Swamps and Sedgelands	7	394
1370	NEWNES PLATEAU MONTANE HANGING SWAMP COMPLEX associated with Triassic sandstone									
Newnes Plateau	Triassic SS	Associated with seepage areas on shallow soils over rock, typically on moderate to steep gradients. Commonly occupying seepage over rock scarps and above cliff lines.	Mid high to tall shrubland	1370	51	*Lepidosperma limicola, L. juniperinum, Gleichenia* etc	*E. gregsoniana*			
Newnes Plateau				1371	51	*Lepidosperma limicola, L. juniperinum,*	*E. gregsoniana*		2	270
Newnes Plateau				1372	51	*Gleichenia* etc.				3
1390	MONTANE GRAMMINOID SWAMP									
x				1390	53	Gramminoid swamp	*Poa labillardieri, Carex* etc	*Poa lab, Carex* etc.	2	97
1400	MT WALKER SUBALPINE EUCALYPT WOODLAND associated with high elevation Devonian ridges (E. viminalis / E. pauciflora)									
Coxs Valley (Mount Walker)	Devonian	Upper slopes, ridge tops	Mid high to tall, open forest	1400	14	*E. viminalis, E. pauciflora*	*E. dalrympleana, A.falciformis, E. dives*			

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Coxs Valley (Mount Walker)	Devonian	Upper slopes, ridge tops	Low to Mid high, open forest	1401	14	*E. pauciflora*	*E. viminalis, E. sieberi, E. dives, E. dalrympleana*		1	4
				1402	14	*E. viminalis, E. pauciflora*			1	7
1410	COX VALLEY MONTANE / SUBALPINE EUCALYPT FOREST / WOODLAND associated with cold air drainage flats and watercourses (*E. pauciflora / E. dalrympleana / E. viminalis, E. aggregata*)									
Coxs Valley (Lidsdale - Falnash)	Permian / Devonian	Drainage lines and flats with cold air drainage and sinks	Tall to very tall, woodland to open forest	1410	11	*E. viminalis, E. dalrympleana E. bridgesiana, E. pauciflora, E. stellulata, E. aggregata*	*E. melliodora E. dives, E. macrorhyncha / E. cannonii, E. rubida*		4	235
Coxs Valley	Permian	Valley floor remnants occupying low gradient drainage lines and flats. Highly modified lands (cleared / semi-cleared for grazing),	Tall to very tall open forest	1411	15	*E. aggregata, E. dalrympleana*	*E. rubida, E. pauciflora, E. stellulata, E. dives, E. viminalis*	800-900	1	161
Coxs Valley	Permian	Valley floor remnants occupying low gradient drainage lines and flats. Highly modified lands (cleared / semi-cleared for grazing),	Tall to very tall open forest	1412	11	*E. dalrympleana*	*E. rubida, E. pauciflora, E. dives, E. aggregata*	800-900	2	371
Coxs Valley	Permian	Valley floor remnants occupying low gradient drainage lines and flats. Highly modified lands (cleared / semi-cleared for grazing),	Tall to very tall woodland to open forest	1413	15	*E. aggregata*	*E. rubida, E. dalrympleana, E. pauciflora, E. stellulata, E. viminalis*	800-900	1	24
Coxs Valley (Lidsdale - Falnash)	Permian / Devonian	Main watercourses with cold air drainage and sinks	Very tall, woodland to open forest	1414	11	*E. viminalis, E. dalrympleana E. bridgesiana, E. pauciflora*	*E. melliodora E. dives, E. stellulata, E. macrorhyncha / E. cannonii*	>800	6	739
				1414	35					

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Coxs valley		Watercourses with cold air drainage and sinks	Mid high to tall open forest	1416	15	*E. pauciflora, E. stellulata*	*E. bridgesiana*		1	10
1420	COXS VALLEY DRY OPEN EUCALYPT WOODLANDS associated with Permian escarpment slopes and ridges (*E. rossii / E. dives / E. cannonii*)									
Cox Valley	Permian	Dry escarpment slopes on Permian sediments . Eastern part of valley occurs below Triassic sandstone, Limited presence of residual Triassic sandstone at Western side of valley (E. g. Ben Bullen)	Mid high to tall open forest	1420	37	*E. macrorhyncha / E. cannonii, E. rossii, E. dives*	*E. mannifera, E. rubida, E. sparsifolia*		4	1378
Coxs Valley (Ben Bullen SF Sth)	Permian			1421	37	*E. rossii, E. dives, E. macrorhyncha / E. cannonii+ / -E. mannifera+ / -*	*E. sparsifolia*		15	1067
Coxs Valley (Ben Bullen SF Sth)	Permian	Dry exposed slopes and ridge tops. Little or no SS above	Low to tall, woodland to open forest	1423	37	*E. rossii*	*E. dives, E. macrorhyncha / E. cannonii, E. mannifera, E. rubida*	*E. dives* occ. codominant with *E. rossii*	2	199
Coxs Valley (Ben Bullen SF Sth)	Permian	Semi sheltered aspects		1424	33	*E. macrorhyncha / E. cannonii, E. dives, E. mannifera*	*E. rossii*		1	67
				1427	32	*E. sparsifolia*	*E. mannifera, E. rossii*	Lidsdale slopes and ridges		14
1430	MONTANE / SUBALPINE EUCALYPT FOREST / WOODLAND associated with high elevation ridge tops and semi-sheltered slopes (*E. pauciflora / E. dalrympleana / E. radiata*)									
Gurnang - Jenolan		Exposed to semi-sheltered ridge tops and slopes		1430	6	*E. pauciflora, E. dalrympleana, E. radiata*	*E. rubida, E. viminalis, E. dives, E. dalrympleana, E. fastigata*		2	860
				1430	14					
Gurnang - Jenolan		Exposed to semi-sheltered ridge tops and slopes		1431	14	*E. pauciflora,*	*E. rubida, E. viminalis, E. dives, E. dalrympleana*		2	195
Gurnang -		Exposed to semi-sheltered		1438	6	*E. dalrympleana, E.*	*E. pauciflora, E. dives,*		6	735

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Jenolan		ridge tops and slopes				*radiata*	*E. fastigata, E. cypellocarpa, E. viminalis*			
1440	MONTANE / SUBALPINE DRY GRASSY WOODLANDS associated with exposed high elevation ridges (*E. dives / E. rubida / E. viminalis*)									
Gurnang - Jenolan		Exposed dry ridge tops and slopes		1440	14	*E. dives, E. rubida, E. pauciflora, E. dalrympleana, E. viminalis*	*E. radiata*		1	332
				1440	31					
Gurnang - Jenolan		Exposed dry ridge tops and slopes		1443	31	*E. dives*	*E. pauciflora, E. dalrympleana, E. radiata, E. viminalis*		1	298
Gurnang - Jenolan		Exposed dry ridge tops and slopes		1444	31	*E. dives, E. dalrympleana*	*E. radiata, E. viminalis*		4	174.8
Gurnang - Jenolan		Exposed dry ridge tops and slopes		1445	14	*E. pauciflora, E. rubida*			2	132
Gurnang - Jenolan		Exposed dry ridge tops and slopes		1446	14	*E. rubida*	*E. pauciflora*			32
Gurnang - Jenolan		Exposed dry ridge tops and slopes		1447	31	*E. dives, E. rubida*	*E. viminalis*		2	259
Gurnang - Jenolan		Exposed dry ridge tops and slopes		1448	31	*E. viminalis*	*E. rubida, E. dives*		1	282
1450	MONTANE DRY EUCALYPT FOREST / WOODLAND associated with exposed high elevation ridge tops (*E. sieberi / E. radiata*)									
Gurnang - Jenolan	Not sandstone. On granite?, Silurian metasediments?	Ridge tops, spurs and upper slopes		1450	25	*E. sieberi, E. radiata*	*E. dives, E. cypellocarpa, E. blaxlandii*		2	120
Gurnang - Jenolan	Not sandstone. On granite?, Silurian metasediments?	Ridge tops, spurs and upper slopes		1451	25	*E. sieberi*	*E. radiata, E. dives*		2	31
Gurnang - Jenolan	Not sandstone. On granite?, Silurian metasediments?	Ridge tops, spurs and upper slopes		1452	25	*E. radiata*	*E. sieberi, E. dives*		2	55
1460	TABLELANDS TALL EUCALYPT FORESTS associated with semi sheltered aspects and gullies (*E. dalrympleana / E. radiata*)									
Gurnang - Jenolan		Semi-sheltered to sheltered aspects and gullies		1460	6	*E. dalrympleana, E. viminalis*	*E. fastigata, E. radiata, E. dives, E. pauciflora*		2	804
Gurnang -		Semi-sheltered to sheltered		1462	6	*E. dalrympleana*	*E. pauciflora, E. dives,*		2	45

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Jenolan		aspects and gullies					*E. radiata*			
Gurnang - Jenolan		Semi-sheltered to sheltered aspects and gullies		1465	11	*E. viminalis*	*E. dives, E. dalrympleana*		3	293
1470	MONTANE TALL EUCALYPT FOREST - associated with sheltered aspects and gullies (*E. fastigata*)									
Gurnang - Jenolan		Sheltered aspects and gullies		1470	5	*E. fastigata, E. dalrympleana, E. viminalis, E. radiata*	*E. pauciflora*		4	878
Gurnang - Jenolan		Sheltered aspects and gullies		1471	5	*E. fastigata*	*E. dalrympleana*		2	190.8
Gurnang - Jenolan		Sheltered aspects and gullies		1472	5	*E. fastigata, E. dalrympleana*	*E. radiata, E. pauciflora*		12	1203
Gurnang - Jenolan		Sheltered aspects, gullies and creeks		1474	5	*E. fastigata, E. viminalis*	*E. pauciflora*		1	63
Gurnang - Jenolan		Exposed to semi-sheltered ridges		1475	5	*E. fastigata, E. dalrympleana, E. radiata*	*E. pauciflora*	Slightly drier var than 1472	4	319.2
1490	MONTANE / SUBALPINE EUCALYPT FORESTS / WOODLAND associated with gullies and major watercourses (*E. pauciflora / E. dalrympleana / E. viminalis*)									
Gurnang - Jenolan		Gullies and major watercourses		1490	11	*E. pauciflora, E. dalrympleana, E. viminalis*	*E. stellulata E. rubida*			100
Gurnang - Jenolan		Gullies		1491	11	*E. pauciflora, E. dalrympleana*	*E. stellulata, E. fastigata, E. viminalis*		2	116
Gurnang - Jenolan		Low gradient streams / rivers		1493	11	*E. viminalis, E. dalrympleana*	*E. stellulata, E. pauciflora, E. radiata*			228
1500	SUBALPINE EUCALYPT FOREST / WOODLAND associated with cold air drainage flats and watercourses (*E. stellulata*)									
Gurnang - Jenolan		Cold air drainage sinks and watercourses		1500	15	*E. stellulata, E. pauciflora*	*E. radiata, E. dalrympleana*			133
Gurnang - Jenolan		Cold air drainage sinks and watercourses		1501	15	*E. stellulata*	*E. pauciflora, E. radiata, E. dalrympleana*		2	54
1510	ACACIA COMPLEX associated with previous disturbance (various spp.)									
x				1510	58	Various spp.				197
Oberon				1511	58	*A. dealbata*				20
Jenolan				1512	58	*A. falciformis*				13

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Capertee		Dry ridge tops (Box-Ironbark-Pine)	Tree growth form regerated from past clearing	1513	58	*A. cheelii*			2	67
				1514	58	*A. ixiodes*		Typically low and dense, assoc with severe disturbance. Occurs as dense us as well as dominant community. Grades into marl as well as *E. dawsonii*		
1520	WOLGAN-CAPERTEE TALL FOREST associated with streamside flats and escarpment foot slopes (*E. punctata* / *A.floribunda*)									
Capertee and Wolgan Valleys	Permian	lower foot slopes adjacent riparian communities along Capertee and Wolgan Rivers	Tall to very tall open forest	1520	54	*E. punctata, A.floribunda, E. blakelyii*			4	109
1540	MT AIRLY EUCALYPT FOREST associated with Triassic sandstone (E. piperita / E. sparsifolia)									
Capertee Valley (Mount Airly)	Triassic SS	Sheltered to semi-sheltered sites commonly occurring between sandstone outcrops		1540	27	*E. piperita, E. sparsifolia, E. cannonii, E. mannifera*				118
Capertee Valley (Mount Airly)				1541	29	*E. piperita*			2	129
				1541	27					
Capertee Valley (Mount Airly)				1542	27	*E. piperita, E. sparsifolia, E. mannifera*		Dominant composition varies, one may be locally absent.	3	221
1550	TALL OPEN EUCALYPT FOREST AND WOODLAND associated with small residual Tertiary basalt capping (E. cannonii / E. viminalis)									
Capertee Valley	Tertiary basalt	Basalt cap	Tall to very tall, open forest	1550	10	*E. viminalis, E. cannonii, E. mannifera*	*E. polyanthemos, E. cypellocarpa*			87
Capertee Valley	Tertiary basalt	Basalt cap	Tall to very tall, open forest	1552	10	*E. viminalis*	*E. cannonii, E. polyanthemos, E. cypellocarpa*		3	28
Capertee Valley	Tertiary basalt	Basalt cap	Tall to very tall, open forest	1553	10	*E. cannonii, E. mannifera*			1	21

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Capertee Valley	Tertiary basalt	Basalt cap	Tall to very tall, open forest	1554	10	*E. polyanthemos*	*E. viminalis, E. cannonii*			4
1560	CAPERTEE EUCALYPT FOREST associated with residual sandstone capping (*E. punctata* / *E. sparsifolia*)									
Capertee Valley	Triassic SS	Upper slopes and broad ridge tops	Low to tall, woodland to open forest	1560	21	*E. punctata, E. sparsifolia*	*E. piperita, E. cannonii*		2	463
Capertee Valley	Triassic SS	Semi-sheltered to sheltered gullies	Low to tall, woodland to open forest	1561	21	*E. punctata*	*E. sparsifolia, E. piperita, E. cannonii*	Fine split, perhaps merge1561 and 1560	1	26
1590	CAPERTEE TRANSITIONAL DRY EUCALYPT FOREST / WOODLAND associated with lower Permian sediments grading to Devonian side slopes and ridges (*E. punctata* / *E. albens* intergrade)									
Capertee Valley	Permian grading to Devonian	Permian / Devonian side slopes and residual ridges.	Low to mid high woodland to open forest	1590	38	*E. punctata, E. sparsifolia / E. cannonii, E. crebra / fibrosa+ / -, Callitris, E. albens, E. rossii*	*E. moluccana, E. polyanthemos*	Generally larger crowns than 1160 grp. *E punctata* typically present.	2	1059
Capertee Valley	Permian grading to Devonian	Permian / Devonian side slopes and residual ridges.	Low to mid high woodland to open forest	1591	21	*E. punctata, E. sparsifolia, E. crebra / fibrosa+ / -*	*E. albens, Callitris, E. polyanthemos*	*E. punctata* usually dominant. Also common in sheltered gullies within fine crown ridge system.	2	1660
Capertee Valley	Permian grading to Devonian	Permian / Devonian ridges and side slopes. Alt > 500m at mid valley (e.g. 'Watervale')	Low to mid high woodland to open forest	1592	38	*Callitris, E. punctata, E. sparsifolia / E. cannonii, E. crebra / fibrosa+ / -*	*E. albens, E. moluccana*	*Callitris* co-dominant or locally dominant. Use 1180 grp for steeper drier sites likely to have *E. dealbata*		290
Capertee Valley	Permian grading to Devonian. Mostly Permian.		Low to mid high woodland to open forest	1593	17	*E. albens, E. punctata+ / - E. crebra / fibrosa+ / -*	*E. bakelyi, A.floribunda, E. sparsifolia / E. cannonii, Callitris, E. melliodora, E. dealbata* (local), *E. sideroxylon*	Transitional wbx type. Similar to 1168 but occurring on Permian geol only (1168 grades to Devonian metaseds) Occurring mid to lower Permian slopes, occ. Triassic sandstone above. Transitional with 1271 but *E. punctata* present. Also occurs SE Capertee Permian talus lower / mid slopes.	3	1489

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Capertee Valley	Permian grading to Devonian	Occasionally sandstone above. Occurring at the change in grade from Permian shale slopes to residual lower Permian valley ridges (conglomerate?). Slightly deeper soils. Grades to 1160 grp and 1271 grp in places.	Low to mid high woodland to open forest	1594	38	*E. punctata, E. cannonii, E. crebra / fibrosa+ / -, E. rossii*	*E. albens, E. blakelyii, E. polyanthemos, E. melliodora*	Transitional Permian shale slopes to Permian conglomerate (1160 grp) etc. Less steep than1595. Grades up to 1595 and down (along) to 1160. Perhaps merge.	3	684
Capertee and Wolgan Valleys	Permian grading to Devonian	Residual Permian slopes, sandstone above scant or absent (not massive). Typically situated above 1593 and 1594. On W side occurs generally above 650m	Low to mid high woodland to open forest	1595	32	*E. crebra / fibrosa+ / -, E. punctata+ / -, E. sparsifolia / E. cannonii, E. polyanthemos, E. melliodora, E. rossii*	*E. mannifera, E. dives, E. albens*	Various combinations. Stringybark and Scribbly Gum probably more common as a sub type. Stringybark always present. Occ. *E. mannifera* and *E. dives* > 800m. Occ. *E. albens* < 700m. Common on western rim residual Permian slopes e.g. Capertee area. Ironbark tends to occur in localised patches in more exposed spurs and aspects as an open forest woodland. Scribbly Gum - Stringybark commonly dominant on residual Permian plateau (sandstone?) sites e.g. south from Capertee. Grades into 1594 and 1160.	10	2106
				1595	21					

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Capertee Valley	Permian grading to Devonian	Steep exposed side slopes associated with lower Permian (conglomerate?) valley ridges typically capped by 1160 grp. W side of valley. Similar to 1593 but just above wbx line. Probably still on Permian sediments.	Low to mid high woodland to open forest	1596	38	*E. fibrosa, E. rossii, E. punctata+ / -*	*E. albens, E. cannonii*			95
Wolgan Valley	Permian grading to Devonian			1598	21	*E. melliodora*	*E. polyanthemos*		1	61
Capertee Valley	Permian grading to Devonian	Steep lower Permian side slopes grading into Devonian metaseds. Usually below 1160 grp. Alt > 500m at W side of valley		1599	38	*E. crebra / fibrosa, E. moluccana, Callitris*	*E. albens, E. sparsifolia*			184.8
1600	JENOLAN / TUGLOW LIMESTONE ROCK SCRUB - EUCALYPT WOODLAND COMPLEX (*Bursaria / Dodonaea*)									
			Rock complex that includes various growth forms (not feasible to map discrete growth forms).	1600		*E. dalrympleana, E. bicostata, Bursaria Dodoneae*				
Gurnang - Jenolan	Jenolan limestone		Rock/shrub complex	1601	23	*Bursaria, Dodonaea*	*B. populneus*		3	29
				1601	48					
Gurnang - Jenolan	Jenolan limestone		Rock/woodland complex	1602	23	*E. dalrympleana, Bursaria, Dodonaea*	*B. populneus*			56
				1602	48					
Gurnang - Jenolan	Jenolan limestone		Rock/woodland complex	1603	23	*E. bicostata, Bursaria, Dodonaea*				2
				1603	48					
Gurnang - Jenolan	Limestone outcropping		Rock complex	1604	48	Unidentified rock, shrub, grass etc.				27
1610	JENOLAN MONTANE DRY EUCALYPT FOREST associated with exposed ridge tops and slopes (*E. blaxlandii*)									
Gurnang - Jenolan		Exposed dry ridge tops and slopes		1610	24	*E. blaxlandii, E. radiata, E. cypellocarpa*	*E. sieberi, E. punctata, E. viminalis*			19

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Gurnang - Jenolan		Exposed dry ridge tops and slopes		1611	24	*E. blaxlandii*	*E. radiata, E. punctata*		1	33
Gurnang - Jenolan		Exposed dry ridge tops and slopes		1612	24	*E. blaxlandii, E. radiata*	*E. sieberi, E. cypellocarpa*		3	252
Gurnang - Jenolan		Exposed dry ridge tops and slopes		1613	24	*E. blaxlandii, E. cypellocarpa*	*E. radiata, E. viminalis*		3	92
1620	JENOLAN GORGE DRY EUCALYPT FOREST (*E. punctata* / *E. eugeinoides*)									
Gurnang - Jenolan		Semi-sheltered to sheltered slopes		1620	22	*E. eugenioides, E. punctata, E. cypellocarpa*	*E. melliodora*		1	17.9
Gurnang - Jenolan		Semi-sheltered to sheltered slopes		1621	22	*E. eugenioides, E. punctata*	*E. melliodora*		2	93
Gurnang - Jenolan		Semi-sheltered to sheltered slopes		1622	22	*E. eugenioides, E. cypellocarpa*			1	133
Gurnang - Jenolan		Semi-sheltered to sheltered slopes		1623	22	*E. eugenioides, E. punctata, E. cypellocarpa*	*E. melliodora*		1	65
Gurnang - Jenolan		Exposed slopes		1624	22	*E. eugenioides, E. punctata, E. melliodora*		Exposed, more open variant of 1620		27
Gurnang - Jenolan				1625	22	*E. cypellocarpa*	*E. eugenioides, E. punctata*			3
1640	JENOLAN DRY EUCALYPT FOREST associated with proximity to Jenolan limestone (*E. bicostata*)									
Gurnang - Jenolan	Silurian metasediments and limestone, riparian	Sheltered slopes		1640	24	*E. bicostata, E. blaxlandii*		Proximity to limestone		22
Gurnang - Jenolan	Silurian limestone	Sheltered slopes		1641	24	*E. bicostata*			1	6
1650	JENOLAN RIPARIAN TALL EUCALYPT AND RIVER OAK FOREST									
Gurnang - Jenolan	Silurian metasediments and limestone, riparian	Riparian	Very tall open forest	1650	55	*E. bicostata* + / -, *E. dalrympleana, C. cunninghamiana*		Proximity to limestone (in alluvium?)		16
1660	JENOLAN TALL EUCALYPT FOREST associated with alluvial river flats (*E. fastigata*)									
Gurnang - Jenolan	Silurian metasediments and limestone, riparian	Riparian on river flats. Jenolan River upstream from caves.	Very tall open forest	1660	5	*E. fastigata, E. dalrympleana, E. viminalis*		Occurring on alluvium. Proximity to limestone	2	34

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1670 JENOLAN GORGE ROUGHBARKED APPLE FOREST (*A. floribunda*)										
Gurnang - Jenolan		Semi sheltered to sheltered slopes		1670	6	*A. floribunda, E. dalrympleana*	*E. eugenioides, E. fastigata*	Adjacent to major streams (Jenolan River)		13
1680 CAPERTEE DRY EUCALYPT WOODLAND associated with exposed escarpment talus slopes (*E. melliodora*)										
Capertee Valley	Permian	Dry escarpment slopes on Permian sediments below Triassic sandstone	Mid high to tall woodland to open forest	1680		*E. melliodora, E. moluccana, B. populneus, Ficus* spp.	*E. blakelyi, A. floribunda, E. punctata, E. albens*	Unusual type, east section Capertee Valley		
Capertee Valley	Permian	Dry escarpment slopes on Permian sediments below Triassic sandstone	Mid high to tall woodland to open forest	1682	17	*E. melliodora, E. moluccana*	*E. blakelyi, E. albens*	East section Capertee Valley	1	45
1690 CAPERTEE DRY EUCALYPT WOODLAND / FOREST associated with escarpment talus foot slopes (*E. dawsonii*)										
Capertee Valley	Permian	Mid to lower slopes on Permian sediments extending to valley floor	Tall to very tall woodland to open forest	1690	41	*E. dawsonii, E. albens, C.endlicheri, E. melliodora, E. crebra*	*E. punctata, E. sideroxylon, E. blakelyi, A. floribunda*	Transitional between steeper talus slope and valley lower gradient valley floor box grp. Composition within this group varies due to disturbance associated with accessibility.	1	617
Capertee Valley	Permian	Mid to lower slopes on Permian sediments extending to valley floor	Tall to very tall woodland to open forest	1691	41	*E. dawsonii, C. endlicheri, E. albens*	*E. punctata, E. moluccana, E. sideroxylon, E. melliodora, E. crebra*	Expect *E. dawsonii* was utilised in past and in many areas was previously more abundant.	2	201
1700 COX VALLEY TALL EUCALYPT FOREST associated with sheltered Permian slopes and gullies (*E. dalrympleana / E. fastigata*)										
Cox Valley	Permian	Sheltered escarpment slopes on Permian sediments.	Mid high to tall open forest	1700	8	*E. dalrympleana, E. blaxlandii, E. fastigata, E. macrorhyncha / E. cannonii, E. sparsifolia, E. eugenioides*	*E. viminalis*	Use 1703 for defined gullies and 1700 for side slopes	1	645
				1700	37					
Cox Valley (Ben Bullen SF Sth)				1701	8	*E. dalrympleana*	*E. blaxlandii, E. fastigata*			40

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
Coxs Valley (Ben Bullen SF Sth)	Permian	Residual Triassic sandstone in proximity? Semi-sheltered sites		1702	37	*E. blaxlandii, E. macrorhyncha / E. cannonii, E. sparsifolia, E. eugenioides*	*E. rossii, E. dives, E. bridgesiana*		1	217
				1703	8	*E. fastigata, E. dalrympleana, E. cypellocarpa*	*E. blaxlandii*			639
2030	EXOTICS									
x				2030		Exotics				
				2031	60	Exotic trees (non pine, various species., Willow etc)				53
				2032	60	Exotic trees (Sycamore)				10
x				2033	59	Exotic trees (Eucalypt / Pine mix, Pine > 30%)		Exotic species indicated by disturb feature (e.g. 34 for pine)		280
x				2034	59	Exotic trees (Pine plantation / woodlot / shelterbelt)		Includes infrastructures assoc with replanting / harvested areas etc		8611
				2035	60	Exotic shrub / scrub (Blackberry etc)		Blackberry etc.		11
2060	RIPARIAN COMPLEX									
Coxs / Wolgan / Capertee valleys	Permian? / Devonian	Coxs, Wolgan, Capertee Rivers and major tributaries	Various growth forms intermixed with rock, water and gravel beds	2060	55					48.5
Capertee valley	Permian? / Devonian	Capertee Rivers and major tributaries	Riparian scrub	2061	57		*M.linariifolia* etc.			31
2080	ROCK COMPLEX - generic / unidentified									
			Rock complex that includes various growth forms (not feasible to map discrete growth forms).	2080	49					12
3000	INFRASTRUCTURE - various									
x				3000	62	Various				20
x				3010	62	Transmission Line				84

Locality	Geology	Topographic Position and Habitat	Structural Formation	API Code	Map Unit Allocation	CANOPY 1 Common Dominant / Codominants	CANOPY 2 Associates (Subsidiary and Minor)	Comments	Sites	Area
						Easement				
x				3020	62	Road and Rail Infrastructures / Verges		Includes fire-breaks		137
x				3040	62	Mining / Quarry (and Associated Infrastructures)				220
x				3050	62	Open Water (Dams etc.)				51.1
4000	CLEARED / SEVERELY DISTURBED LANDS									
x				4000	62	Cleared lands (tree cover >5 CSR)		Includes very sparsely scattered / isolated paddock trees i.E. CSR >5	9	49099
				4001	62	Pioneering shrubs / saplings present				94
				4002	62	Planted native species. Erosion mitigation etc.				16
	Triassic SS	Sandstone cliff, rock fall		4003	62	Rock				5
5000	NOT CLASSIFIED									
x				5000	61	Not classified. Refer to comments field			7	112
				5001	61	Not classified. Veg remnants < 1 ha				660

APPENDIX B: PLANT SPECIES LIST

Following is a list of the native and exotic species recorded from systematic flora sites from the study area and the adjoining environs within a 20 kilometre radius. The list is sorted by Division, Family and then by Scientific Name of the species. A common name is provided where one has been recognised in existing literature.

PTERIDOPHYTA

ADIANTACEAE

Adiantum aethiopicum	Common Maidenhair
Adiantum formosum	Giant Maidenhair
Adiantum hispidulum	Rough Maidenhair
Cheilanthes austrotenuifolia	Rock Fern
Cheilanthes distans	Bristly Cloak Fern
Cheilanthes sieberi subsp. *sieberi*	
Pellaea calidirupium	
Pellaea falcata	Sickle Fern
Pellaea nana	Dwarf Sickle Fern
Pellaea paradoxa	

Aspleniaceae

Asplenium australasicum forma *australasicum*	Bird's Nest Fern
Asplenium bulbiferum subsp. *gracillimum*	Mother Spleenwort
Asplenium flabellifolium	Necklace Fern
Asplenium trichomanes	
Pleurosorus rutifolius	

Athyriaceae

Diplazium australe	

Blechnaceae

Blechnum ambiguum	
Blechnum cartilagineum	Gristle Fern
Blechnum indicum	Swamp Water Fern
Blechnum minus	Soft Water Fern
Blechnum nudum	Fishbone Water Fern
Blechnum patersonii	Strap Water Fern
Blechnum wattsii	Hard Water Fern
Doodia aspera	Prickly Rasp Fern
Doodia australis	Common Rasp Fern

Cyatheaceae

Cyathea australis	Rough Treefern
Cyathea leichhardtiana	Prickly Treefern

Davalliaceae

Arthropteris tenella	

Dennstaedtiaceae

Dennstaedtia davallioides	Lacy Ground Fern
Histiopteris incisa	Bat's Wing Fern
Hypolepis glandulifera	
Hypolepis muelleri	Harsh Ground Fern
Pteridium esculentum	Bracken

Dicksoniaceae

Calochlaena dubia	Common Ground Fern
Dicksonia antarctica	Soft Treefern

Dryopteridaceae

Lastreopsis acuminata	Shiny Shield Fern
Lastreopsis decomposita	Trim Shield Fern
Lastreopsis microsora subsp. *microsora*	
Polystichum australiense	Harsh Shield Fern
Polystichum fallax	
Polystichum proliferum	Mother Shield Fern

Gleicheniaceae

Gleichenia dicarpa	Pouched Coral Fern, Tangle Fern
Gleichenia microphylla	
Gleichenia rupestris	
Sticherus flabellatus var. *flabellatus*	Umbrella Fern
Sticherus lobatus	Spreading Shield Fern

Grammitaceae

Grammitis billardierei	Finger Fern

Hymenophyllaceae

Hymenophyllum australe	
Hymenophyllum cupressiforme	Common Filmy Fern
Hymenophyllum flabellatum	Shiny Filmy Fern

Hymenophyllum pumilum	

Lindsaeaceae

Lindsaea linearis	Screw Fern
Lindsaea microphylla	Lacy Wedge Fern

Lycopodiaceae

Lycopodiella lateralis	
Lycopodium deuterodensum	Bushy Clubmoss

Ophioglossaceae

Ophioglossum lusitanicum	Adder's Tongue

Osmundaceae

Leptopteris fraseri	
Todea barbara	King Fern

Polypodiaceae

Microsorum pustulatum	Kangaroo Fern
Microsorum scandens	Fragrant Fern
Pyrrosia rupestris	Rock Felt Fern

Pteridaceae

Pteris tremula	Tender Brake

Schizaeaceae

Schizaea bifida	Forked Comb Fern
Schizaea dichotoma	Branched Comb Fern

Selaginellaceae

Selaginella uliginosa	

GYMNOSPERMAE

CUPRESSACEAE

Callitris endlicheri	Black Cypress Pine
Callitris glaucophylla	White Cypress Pine
Callitris muelleri	
Callitris rhomboidea	Port Jackson Pine

Pinaceae

**Pinus radiata*	Radiata Pine

Podocarpaceae

Podocarpus spinulosus	

Zamiaceae

Macrozamia communis	Burrawang
Macrozamia reducta	
Macrozamia secunda	
Macrozamia spiralis	

ANGIOSPERMAE

Dicotyledonae

Acanthaceae

Brunoniella australis	Blue Trumpet
Pseuderanthemum variabile	Pastel Flower

Aceraceae

**Acer spp.*	

Amaranthaceae

Alternanthera denticulata	Lesser Joyweed
Amaranthus spp. (?viridis)	
Deeringia amaranthoides	
Nyssanthes diffusa	Barbwire Weed
Nyssanthes erecta	

Amygdalaceae

**Prunus spp.*	

Apiaceae

Actinotus helianthi	Flannel Flower
Actinotus minor	Lesser Flannel Flower
Centella asiatica	Pennywort
Centella cordifolia	
**Conium maculatum*	Hemlock
Daucus glochidiatus	Native Carrot
Hydrocotyle acutiloba	
Hydrocotyle algida	
Hydrocotyle geraniifolia	Forest Pennywort
Hydrocotyle laxiflora	Stinking Pennywort

Hydrocotyle peduncularis	
Hydrocotyle tripartita	Pennywort
Oreomyrrhis eriopoda	Australian Carraway
Platysace clelandii	
Platysace ericoides	
Platysace lanceolata	
Platysace linearifolia	
Trachymene anisocarpa	
Trachymene incisa	
Trachymene saniculifolia	
Xanthosia atkinsoniana	
Xanthosia dissecta	
Xanthosia pilosa	Woolly Xanthosia
Xanthosia tridentata	

Apocynaceae

Parsonsia brownii	Mountain Silkpod
Parsonsia lanceolata	
Parsonsia purpurascens	Black Silkpod
Parsonsia straminea	Common Silkpod

Araliaceae

Astrotricha floccosa	
Astrotricha latifolia	
Astrotricha longifolia	
Cephalaralia cephalobotrys	Climbing Panax
**Hedera helix*	English Ivy
Polyscias sambucifolia	Elderberry Panax, Ferny Panax

Asclepiadaceae

**Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush
**Gomphocarpus spp.*	
Marsdenia flavescens	Hairy Milk Vine
Marsdenia pleiadenia	
Marsdenia rostrata	Common Milk Vine
Marsdenia suaveolens	Scented Marsdenia
Marsdenia viridiflora subsp. *viridiflora*	Native Pear
Tylophora barbata	Bearded Tylophora
Tylophora grandiflora	Small-leaved Tylophora
Tylophora paniculata	Thin-leaved Tylophora

Asteraceae

**Achillea millefolium*	Yarrow
**Ageratina adenophora*	Crofton Weed
**Ambrosia tenuifolia*	Lacy Ragweed
**Arctotheca calendula*	Capeweed
Arrhenechthites mixta	Purple Fireweed
**Aster subulatus*	Wild Aster
**Bidens pilosa*	Cobbler's Pegs
**Bidens subalternans*	Greater Beggar's Ticks
Brachyscome aculeata	Hill Daisy
Brachyscome angustifolia	
Brachyscome angustifolia var. *angustifolia*	
Brachyscome ciliaris var. *ciliaris*	
Brachyscome dissectifolia	
Brachyscome diversifolia var. *dissecta*	
Brachyscome diversifolia var. *diversifolia*	
Brachyscome formosa	Pillaga Posy
Brachyscome gracilis	
Brachyscome graminea	
Brachyscome heterodonta var. *heterodonta*	
Brachyscome melanocarpa	Black-seeded Daisy
Brachyscome microcarpa	
Brachyscome multifida	Cut-leaved Daisy
Brachyscome nodosa	
Brachyscome perpusilla var. *tenella*	Tiny Daisy
Brachyscome ptychocarpa	
Brachyscome rigidula	
Brachyscome scapigera	
Brachyscome spathulata	
Brachyscome stuartii	
Calomeria amaranthoides	Incense Plant
Calotis cuneata var. *cuneata*	
Calotis cuneifolia	Purple Burr-Daisy
Calotis dentex	
Calotis hispidula	Bogan Flea
Calotis lappulacea	Yellow Burr-daisy
Calotis scabiosifolia var. *scabiosifolia*	
**Carduus nutans* subsp. *nutans*	Nodding Thistle
**Carduus pycnocephalus*	Slender Thistle
**Carduus tenuiflorus*	Winged Slender Thistle
**Carthamus lanatus*	Saffron Thistle
Cassinia aculeata	Dolly Bush
Cassinia arcuata	Sifton Bush
Cassinia aureonitens	
Cassinia cunninghamii	
Cassinia denticulata	
Cassinia laevis	Cough Bush
Cassinia leptocephala	
Cassinia longifolia	
Cassinia quinquefaria	
Cassinia species D	
Cassinia trinerva	
Cassinia uncata	Sticky Cassinia
Celmisia longifolia	
**Centaurea melitensis*	Maltese Cockspur
Centipeda cunninghamii	Common Sneezeweed
Centipeda minima	Spreading Sneezeweed
Centipeda minima var. *minima*	
**Chondrilla juncea*	Skeleton Weed

Chrysocephalum apiculatum	Common Everlasting, Yellow Buttons
Chrysocephalum semipapposum	Clustered Everlasting
**Cineraria lyratiformis*	African Marigold
**Cirsium arvense*	Perennial Thistle
**Cirsium vulgare*	Spear Thistle
**Conyza bonariensis*	Flaxleaf Fleabane
**Conyza canadensis* var. *canadensis*	Canadian Fleabane
**Conyza parva*	
**Conyza sumatrensis*	Tall fleabane
Cotula alpina	Alpine Cotula
Cotula australis	Common Cotula
Craspedia canens	
Craspedia glauca	
Craspedia variabilis	
**Crepis capillaris*	Smooth Hawksbeard
Cymbonotus lawsonianus	Bear's Ear
Cymbonotus preissianus	
**Cynara cardunculus*	Cardoon
Epaltes australis	Spreading Nut-heads
Euchiton gymnocephalus	Creeping Cudweed
Euchiton involucratus	Star Cudweed
Euchiton sphaericus	
**Facelis retusa*	
**Gamochaeta americana*	Cudweed
**Gamochaeta spicata*	
Glossogyne tannensis	Cobbler's Tack
Gnaphalium indutum	Tiny Cudweed
Helichrysum adenophorum var. *waddelliae*	
Helichrysum collinum	
Helichrysum elatum	
Helichrysum leucopsideum	Satin Everlasting
Helichrysum rutidolepis	Pale Everlasting
Helichrysum scorpioides	Button Everlasting
**Helminthotheca echioides*	Ox-tongue
**Hypochaeris glabra*	Smooth Catsear
**Hypochaeris radicata*	Catsear
Ixiolaena leptolepis	
**Lactuca serriola*	Prickly Lettuce
Lagenifera gracilis	Slender Lagenophora
Lagenifera stipitata	Blue Bottle-daisy
**Leontodon taraxacoides* subsp. *taraxacoides*	Lesser Hawkbit
Leptinella filicula	
Leptinella longipes	
Leptorhynchos squamatus	Scaly Buttons
**Leucanthemum vulgare*	Oxeye Daisy
Leucochrysum albicans subsp. albicans var. albicans	
Leucochrysum graminifolium	
Microseris lanceolata	
Olearia alpicola	Alpine Daisy Bush
Olearia argophylla	Native Musk
Olearia asterotricha	Rough Daisy Bush
Olearia elliptica subsp. *elliptica*	Sticky Daisy Bush
Olearia erubescens	Silky Daisy Bush
Olearia microphylla	
Olearia myrsinoides	Blush Daisy Bush
Olearia phlogopappa	
Olearia quercifolia	
Olearia ramulosa	
Olearia rosmarinifolia	
Olearia stellulata	
Olearia tenuifolia	
Olearia viscidula	Wallaby Weed
Ozothamnus adnatus	
Ozothamnus diosmifolius	White Dogwood
Picris angustifolia	
**Picris hieracioides*	Hawkweed Picris
Podolepis hieracioides	
Podolepis jaceoides	Showy Copper-wire Daisy
Pseudognaphalium luteo-album	Jersey Cudweed
Rhodanthe diffusa subsp. *leucactina*	
Senecio biserratus	
Senecio diaschides	
Senecio glomeratus	
Senecio hispidulus	Hill Fireweed
Senecio lautus	Variable Groundsel
Senecio linearifolius	
Senecio macranthus	
**Senecio madagascariensis*	Fireweed
Senecio minimus	
Senecio prenanthoides	
Senecio quadridentatus	Cotton Fireweed
Senecio squarrosus	
Senecio tenuiflorus	
Senecio vagus subsp. *eglandulosus*	
Sigesbeckia australiensis	
Sigesbeckia orientalis subsp. *orientalis*	Indian Weed
**Silybum marianum*	Variegated Thistle
Solenogyne bellioides	
Solenogyne dominii	
Solenogyne gunnii	
**Soliva sessilis*	Bindyi
**Sonchus asper* subsp. *glaucescens*	Prickly Sowthistle
**Sonchus oleraceus*	Common Sowthistle
Sonchus spp.	
**Tagetes minuta*	Stinking Roger
**Tanacetum vulgare*	Tansy
**Taraxacum officinale*	Dandelion
**Tolpis umbellata*	
Vernonia cinerea	
Vernonia cinerea var. *cinerea*	

Vittadinia cervicularis var. *subcervicularis*	
Vittadinia cuneata var. *cuneata forma cuneata*	Fuzzweed
Vittadinia cuneata var. *cuneata forma minor*	
Vittadinia cuneata var. *hirsuta*	
Vittadinia dissecta var. *hirta*	
Vittadinia muelleri	
Vittadinia sulcata	
Vittadinia tenuissima	Western New Holland Daisy
**Xanthium* spp.	
Xerochrysum bracteatum	Golden Everlasting
Xerochrysum subundulatum	
Xerochrysum viscosum	

Baueraceae

Bauera rubioides	

Bignoniaceae

Pandorea pandorana	Wonga Wonga Vine

Boraginaceae

Austrocynoglossum latifolium	
Cynoglossum australe	
Cynoglossum suaveolens	
**Echium plantagineum*	Patterson's Curse
**Echium vulgare*	Viper's Bugloss
Ehretia acuminata var. *acuminata*	Koda
Halgania brachyrhyncha	
**Heliotropium amplexicaule*	Blue Heliotrope
**Heliotropium europaeum*	Common Heliotrope
Myosotis australis	Australian Forget-me-not

Brassicaceae

Arabidella spp.	
Cardamine paucijuga	
Cardamine robusta	
**Lepidium africanum*	
**Lepidium bonariense*	
**Rapistrum rugosum*	Turnip Weed
Rorippa laciniata	
**Rorippa nasturtium-aquaticum*	Watercress
**Sisymbrium officinale*	Hedge Mustard

Cactaceae

**Opuntia spp.*	
**Opuntia stricta* var. *stricta*	Common Prickly Pear

Callitrichaceae

Callitriche spp.	

Campanulaceae

Wahlenbergia communis	Tufted Bluebell
Wahlenbergia gracilenta	Annual Bluebell
Wahlenbergia gracilis	Sprawling or Australian Bluebell
Wahlenbergia graniticola	Granite Bluebell
Wahlenbergia littoricola	
Wahlenbergia luteola	
Wahlenbergia multicaulis	Tadgell's Bluebell
Wahlenbergia planiflora	
Wahlenbergia planiflora subsp. *planiflora*	
Wahlenbergia stricta subsp. *alterna*	
Wahlenbergia stricta subsp. *stricta*	Tall Bluebell
Wahlenbergia victoriensis	

Caprifoliaceae

**Lonicera japonica*	Japanese Honeysuckle

Caryophyllaceae

**Arenaria serpyllifolia*	Thyme-leaved Sandwort
**Cerastium balearicum*	Lesser Mouse-ear Chickweed
**Cerastium glomeratum*	Mouse-ear Chickweed
**Lychnis coronaria*	Rose Campion
**Paronychia brasiliana*	Chilean Whitlow Wort
**Petrorhagia nanteuilii*	
**Petrorhagia velutina*	
**Polycarpon tetraphyllum*	Four-leaved Allseed
**Saponaria officinalis*	Soapwort
Scleranthus biflorus	
Stellaria angustifolia	Swamp Starwort
Stellaria flaccida	
**Stellaria media*	Common Chickweed
Stellaria pungens	Prickly Starwort

Casuarinaceae

Allocasuarina diminuta	
Allocasuarina distyla	
Allocasuarina gymnanthera	
Allocasuarina littoralis	Black Sheoak
Allocasuarina luehmannii	Bulloak
Allocasuarina nana	
Allocasuarina torulosa	Forest Oak
Allocasuarina verticillata	Drooping Sheoak
Casuarina cunninghamiana subsp. *cunninghamiana*	River Oak, River Sheoak

Celastraceae

Apatophyllum constablei	
Cassine australis var. *australis*	Red Olive-berry
Celastrus australis	Staff VIne
Celastrus subspicata	

Maytenus cunninghamii	Yellow-berry Bush

Chenopodiaceae

**Chenopodium ambrosioides*	Mexican Tea
Chenopodium carinatum	Keeled Goosefoot
Einadia hastata	Berry Saltbush
Einadia nutans subsp. *nutans*	Climbing Saltbush
Einadia polygonoides	
Einadia trigonos subsp. *leiocarpa*	Fishweed
Einadia trigonos subsp. *stellulata*	
Einadia trigonos subsp. *trigonos*	
Enchylaena tomentosa	Ruby Saltbush
Rhagodia candolleana subsp. *candolleana*	

Chloanthaceae

Chloanthes stoechadis	

Clusiaceae

**Hypericum androsaemum*	Tutsan
Hypericum gramineum	Small St John's Wort
Hypericum japonicum	
**Hypericum perforatum*	St. Johns Wort

Convolvulaceae

Calystegia marginata	
**Convolvulus arvensis*	
Convolvulus erubescens	
Dichondra repens	Kidney Weed
Dichondra species A	
Evolvulus alsinoides var. *decumbens*	

Crassulaceae

Crassula helmsii	Swamp Stonecrop
Crassula sieberiana	Australian Stonecrop

Cucurbitaceae

Sicyos australis	

Cunoniaceae

Aphanopetalum resinosum	Gum Vine
Callicoma serratifolia	Black Wattle
Ceratopetalum apetalum	Coachwood
Ceratopetalum gummiferum	Christmas Bush
Schizomeria ovata	Crabapple

Dilleniaceae

Hibbertia acicularis	
Hibbertia aspera	Rough Guinea Flower
Hibbertia bracteata	
Hibbertia circumdans	
Hibbertia cistiflora subsp. *cistiflora*	
Hibbertia cistoidea	
Hibbertia dentata	Twining Guinea Flower
Hibbertia diffusa	
Hibbertia empetrifolia subsp. *empetrifolia*	
Hibbertia hermanniifolia	
Hibbertia linearis	
Hibbertia monogyna	
Hibbertia obtusifolia	
Hibbertia pedunculata	
Hibbertia riparia	
Hibbertia rufa	
Hibbertia saligna	
Hibbertia scandens	Climbing Guinea Flower
Hibbertia serpyllifolia	
Hibbertia vestita	

Droseraceae

Drosera auriculata	
Drosera binata	
Drosera burmannii	
Drosera peltata	
Drosera spatulata	

Elaeocarpaceae

Elaeocarpus reticulatus	Blueberry Ash

Epacridaceae

Acrotriche aggregata	
Acrotriche divaricata	
Acrotriche rigida	
Acrotriche serrulata	Honeypots
Astroloma humifusum	Native Cranberry
Brachyloma daphnoides	
Dracophyllum secundum	
Epacris breviflora	
Epacris calvertiana var. *calvertiana*	
Epacris coriacea	
Epacris longiflora	Fuchsia Heath
Epacris microphylla	
Epacris muelleri	
Epacris obtusifolia	
Epacris paludosa	Swamp Heath
Epacris pulchella	
Epacris purpurascens var. *onosmiflora*	
Epacris reclinata	
Epacris rigida	
Leucopogon appressus	
Leucopogon attenuatus	

Leucopogon ericoides	
Leucopogon esquamatus	
Leucopogon exolasius	
Leucopogon fletcheri	
Leucopogon fraseri	
Leucopogon hookeri	
Leucopogon juniperinus	Prickly Beard-heath
Leucopogon lanceolatus	
Leucopogon microphyllus var. *microphyllus*	
Leucopogon microphyllus var. *pilibundus*	
Leucopogon muticus	Blunt Beard-heath
Leucopogon neo-anglicus	
Leucopogon setiger	
Leucopogon virgatus	
Lissanthe sapida	Native Cranberry
Lissanthe strigosa	Peach Heath
Melichrus erubescens	Ruby Urn Heath
Melichrus procumbens	Jam Tarts
Melichrus urceolatus	Urn Heath
Monotoca albens MS	
Monotoca elliptica	Tree Broom-heath
Monotoca scoparia	
Sprengelia incarnata	
Styphelia laeta subsp. *laeta*	
Styphelia triflora	Pink Five-Corners
Styphelia tubiflora	
Styphelia viridis subsp. *viridis*	
Woollsia pungens	

Escalloniaceae

Abrophyllum ornans	Native Hydrangea
Polyosma cunninghamii	Featherwood
Quintinia sieberi	Possumwood

Euphorbiaceae

Amperea xiphoclada var. *xiphoclada*	
Bertya pomaderroides	
Beyeria viscosa	Pinkwood, Sticky wallaby Bush
Breynia oblongifolia	Coffee Bush
Chamaesyce drummondii	Caustic Weed
Claoxylon australe	Brittlewood
**Euphorbia lathyrus*	Caper Spurge
**Euphorbia peplus*	Petty Spurge
Micrantheum ericoides	
Omalanthus populifolius	Bleeding Heart, Native Poplar
Phyllanthus gunnii	
Phyllanthus hirtellus	
Phyllanthus similis	
Phyllanthus virgatus	
Poranthera corymbosa	
Poranthera ericifolia	
Poranthera microphylla	
Pseudanthus divaricatissimus	
Pseudanthus pimeleoides	

Eupomatiaceae

Eupomatia laurina	Bolwarra

Fabaceae

Caesalpinioideae	
Senna artemisioides subsp. *zygophylla*	
Faboideae	
Almaleea incurvata	
Aotus ericoides	
Bossiaea buxifolia	
Bossiaea ensata	
Bossiaea foliosa	
Bossiaea heterophylla	Variable Bossiaea
Bossiaea lenticularis	
Bossiaea neo-anglica	
Bossiaea obcordata	Spiny Bossiaea
Bossiaea prostrata	
Bossiaea rhombifolia subsp. *rhombifolia*	
Bossiaea scolopendria	
Bossiaea scortechinii	
Chorizema parviflorum	Eastern Flame Pea
**Cytisus scoparius* subsp. *scoparius*	English Broom
Daviesia acicularis	
Daviesia alata	
Daviesia corymbosa	
Daviesia genistifolia	Broom Bitter Pea
Daviesia latifolia	
Daviesia leptophylla	
Daviesia mimosoides subsp. *mimosoides*	
Daviesia pubigera	
Daviesia squarrosa	
Daviesia ulicifolia subsp. *stenophylla*	Gorse Bitter Pea
Daviesia ulicifolia subsp. *ulicifolia*	Gorse Bitter Pea
Desmodium brachypodum	Large Tick-trefoil
Desmodium gunnii	
Desmodium rhytidophyllum	
Desmodium varians	Slender Tick-trefoil
Dillwynia acicularis	
Dillwynia brunioides	
Dillwynia elegans	
Dillwynia floribunda	
Dillwynia juniperina	
Dillwynia phylicoides	
Dillwynia retorta	

Dillwynia rudis	
Dillwynia sericea	
Dillwynia tenuifolia	
**Genista monspessulana*	Montpellier Broom
Glycine clandestina	
Glycine microphylla	
Glycine pacifica	
Glycine tabacina	
Glycine tomentella	Woolly Glycine
Gompholobium glabratum	Dainty Wedge Pea
Gompholobium grandiflorum	Large Wedge Pea
Gompholobium huegelii	Pale Wedge Pea
Gompholobium inconspicuum	
Gompholobium latifolium	Golden Glory Pea
Gompholobium minus	Dwarf Wedge Pea
Gompholobium uncinatum	Red Wedge Pea
Gompholobium virgatum var. *aspalathoides*	Leafy Wedge Pea
Gompholobium virgatum var. *virgatum*	Leafy Wedge Pea
Goodia lotifolia	
Hardenbergia violacea	False Sarsaparilla
Hovea apiculata	
Hovea heterophylla	
Hovea lanceolata	
Hovea linearis	
Hovea longifolia	
Hovea purpurea	
Indigofera adesmiifolia	
Indigofera australis	
Indigofera coronillifolia	
Jacksonia scoparia	Dogwood
Kennedia rubicunda	Red Kennedy Pea
Lespedeza juncea subsp. *sericea*	
Lotus australis	Australian Trefoil
**Lotus corniculatus*	Birds-foot Trefoil
**Lotus suaveolens*	Hairy Birds-foot Trefoil
**Lotus uliginosus*	Birds-foot Trefoil
**Medicago minima*	Woolly Burr Medic
**Medicago sativa*	Lucerne
Mirbelia oxylobioides	
Mirbelia platylobioides	
Mirbelia pungens	
Mirbelia rubiifolia	
Oxylobium arborescens	Tall Shaggy Pea
Oxylobium pulteneae	Wiry Shaggy Pea
Phyllota phylicoides	Heath Phyllota
Phyllota squarrosa	Dense Phyllota
Platylobium formosum	
Podolobium ilicifolium	Prickly Shaggy Pea
Pultenaea altissima	
Pultenaea canescens	
Pultenaea capitellata	
Pultenaea cinerascens	
Pultenaea divaricata	
Pultenaea echinula	
Pultenaea flexilis	
Pultenaea hispidula	
Pultenaea lapidosa	
Pultenaea microphylla	
Pultenaea paleacea	
Pultenaea procumbens	
Pultenaea retusa	
Pultenaea scabra var. *scabra*	
Pultenaea spinosa	
Pultenaea subspicata	
Pultenaea villosa	
**Robinia pseudoacacia*	Black Locust
Sphaerolobium minus	
Sphaerolobium vimineum	
Swainsona galegifolia	Smooth Darling Pea
Templetonia stenophylla	Leafy Templetonia
**Trifolium arvense*	Haresfoot Clover
**Trifolium campestre*	Hop Clover
**Trifolium dubium*	Yellow Suckling Clover
**Trifolium fragiferum*	Strawberry Clover
**Trifolium glomeratum*	Clustered Clover
**Trifolium repens*	White Clover
**Trifolium striatum*	Knotted Clover
**Trifolium subterraneum*	Subterraneum Clover
**Vicia hirsuta*	Hairy Vetch
**Vicia monantha*	Square-stemmed Vetch
**Vicia tetrasperma*	Slender Vetch
Mimosoideae	
Acacia amblygona	Fan Wattle
Acacia amoena	Boomerang Wattle
Acacia asparagoides	
Acacia binervia	Coast Myall
Acacia blakei subsp. *diphylla*	
Acacia brownii	Heath Wattle
Acacia buxifolia subsp. buxifolia	Box-leaved Wattle
Acacia caesiella	Blue Bush
Acacia cheelii	Motherumbah
Acacia clandullensis	
Acacia clunies-rossiae	Kowmung Wattle
Acacia dawsonii	Poverty Wattle
Acacia dealbata subsp. dealbata	Silver Wattle
Acacia deanei subsp. deanei	Green Wattle, Deane's Wattle
Acacia deanei subsp. paucijuga	Green Wattle
Acacia debilis	
Acacia decora	Western Golden Wattle
Acacia decurrens	Black Wattle, Green Wattle

Acacia doratoxylon	Currawang
Acacia dorothea	Dorothy's Wattle
Acacia echinula	Hedgehog Wattle
Acacia elata	Mountain Cedar Wattle
Acacia elongata	Swamp Wattle
Acacia falcata	
Acacia falciformis	Broad-leaved Hickory
Acacia farnesiana	Mimosa Bush
Acacia filicifolia	Fern-leaved Wattle
Acacia floribunda	White Sally
Acacia genistifolia	Early Wattle
Acacia gladiiformis	Sword-leaved Wattle
Acacia gunnii	Ploughshare Wattle
Acacia hamiltoniana	Hamilton'sWattle
Acacia implexa	Hickory Wattle
Acacia irrorata subsp. *irrorata*	Green Wattle
Acacia ixiophylla	
Acacia kybeanensis	Kybean Wattle
Acacia lanigera	
Acacia leiocalyx subsp. *leiocalyx*	Curracabah
Acacia linifolia	Flax-leaved Wattle
Acacia longifolia subsp. *longifolia*	Sydney Golden Wattle
Acacia lunata	Lunate-leaved Acacia
Acacia maidenii	Maiden's Wattle
Acacia melanoxylon	Blackwood
Acacia montana	Mallee Wattle
Acacia myrtifolia	Red-stemmed Wattle
Acacia obliquinervia	Mountain Hickory
Acacia obtusata	
Acacia obtusifolia	
Acacia paradoxa	Kangaroo Thorn
Acacia parramattensis	Parramatta Wattle
Acacia parvipinnula	Silver-stemmed Wattle
Acacia penninervis var. *penninervis*	Mountain Hickory
Acacia ptychoclada	
Acacia rubida	Red-leaved Wattle
Acacia saliciformis	
Acacia spp.	
Acacia stricta	Straight Wattle
Acacia suaveolens	Sweet Wattle
Acacia terminalis	Sunshine Wattle
Acacia terminalis subsp. *angustifolia*	
Acacia terminalis subsp. *aurea*	
Acacia trinervata	Three-nerved Wattle
Acacia ulicifolia	Prickly Moses
Acacia uncinata	Gold-dust Wattle
Acacia venulosa	
Acacia verniciflua	Varnish Wattle

Gentianaceae

**Centaurium erythraea*	Common Centaury
Centaurium spicatum	Spike Centaury
**Centaurium tenuiflorum*	
Chionogentias spp.	

Geraniaceae

Geranium graniticola	
Geranium homeanum	
**Geranium molle* subsp. *molle*	Cranesbill Geranium
Geranium neglectum	
Geranium potentilloides var. *potentilloides*	
Geranium retrorsum	
Geranium solanderi var. *solanderi*	Native Geranium
Pelargonium inodorum	

Gesneriaceae

Fieldia australis	

Goodeniaceae

Brunonia australis	Blue Pincushion
Coopernookia barbata	
Coopernookia spp.	
Dampiera purpurea	
Dampiera stricta	
Goodenia bellidifolia subsp. *bellidifolia*	
Goodenia decurrens	
Goodenia hederacea subsp. *hederacea*	
Goodenia heterophylla subsp. *eglandulosa*	
Goodenia heterophylla subsp. *montana*	
Goodenia ovata	Hop Goodenia
Goodenia paniculata	
Goodenia pinnatifida	
Goodenia rotundifolia	
Goodenia stelligera	
Scaevola albida	Pale Fan-flower
Scaevola ramosissima	Purple Fan-flower
Selliera radicans	
Velleia montana	

Haloragaceae

Gonocarpus elatus	
Gonocarpus humilis	
Gonocarpus longifolius	
Gonocarpus micranthus subsp. *micranthus*	
Gonocarpus micranthus subsp. *ramosissimus*	
Gonocarpus montanus	
Gonocarpus tetragynus	
Gonocarpus teucrioides	Raspwort

Haloragis exalata	
Haloragis heterophylla	
Haloragis serra	
Haloragodendron lucasii	
Myriophyllum pedunculatum subsp. *pedunculatum*	

Lamiaceae

Ajuga australis	Austral Bugle
Hemigenia purpurea	
**Marrubium vulgare*	Horehound
**Melissa officinalis* subsp. *officinalis*	Balm
Mentha diemenica	Slender Mint
Mentha laxiflora	Forest Mint
Mentha satureioides	Native Pennyroyal
Plectranthus graveolens	
Plectranthus parviflorus	
Prostanthera granitica	
Prostanthera hindii	
Prostanthera howelliae	
Prostanthera incana	Velvet Mint-bush
Prostanthera incisa	Cut-leaved Mint-bush
Prostanthera lasianthos	Victorian Christmas Bush
Prostanthera linearis	Narrow-leaved Mint-bush
Prostanthera nivea	Snowy Mint-bush
Prostanthera ovalifolia	
Prostanthera prunelloides	
Prostanthera rhombea	
Prostanthera saxicola	
Prostanthera serpyllifolia subsp. *microphylla*	Small-leaved Mint-Bush
Prostanthera stricta	
**Prunella vulgaris*	Self-heal
**Salvia coccinea*	
Scutellaria humilis	Dwarf Skullcap
Scutellaria mollis	Soft Skullcap
**Stachys arvensis*	Stagger Weed
Teucrium corymbosum	Forest Germander
Teucrium racemosum	Grey Germander
Teucrium species A	

Lauraceae

Cassytha glabella	
Cassytha pubescens	
Cassytha racemosa forma muelleri	
Endiandra introrsa	Dorrigo Plum

Lentibulariaceae

Utricularia dichotoma	Fairy Aprons
Utricularia uniflora	

Linaceae

Linum marginale	Native Flax

Lobeliaceae

Isotoma axillaris	Showy Isotome
Isotoma fluviatilis subsp. *fluviatilis*	
Lobelia dentata	
Pratia pedunculata	Matted Pratia
Pratia purpurascens	Whiteroot

Loganiaceae

Logania albiflora	
Mitrasacme paludosa	
Mitrasacme pilosa var. *stuartii*	
Mitrasacme polymorpha	
Mitrasacme serpyllifolia	

Loranthaceae

Amyema bifurcatum var. *bifurcatum*	
Amyema congener subsp. *congener*	
Amyema miquelii	
Amyema pendulum	
Dendrophthoe glabrescens	
Dendrophthoe spp.	
Muellerina bidwillii	
Muellerina celastroides	
Muellerina eucalyptoides	

Lythraceae

Lythrum hyssopifolia	Hyssop Loosestrife
Lythrum salicaria	Purple Loosestrife

Malaceae

**Cotoneaster glaucophyllus*	
**Cotoneaster pannosus*	
**Cotoneaster* spp.	
**Crataegus monogyna*	
**Pyracantha* spp.	
**Spiraea* spp.	

Malvaceae

Abutilon oxycarpum var. *oxycarpum*	Flannel Weed
Gynatrix pulchella	Hempbush
Hibiscus spp.	
Hibiscus sturtii	Hill Hibiscus
Howittia trilocularis	
**Modiola caroliniana*	Red-flowered Mallow
**Pavonia hastata*	
Sida corrugata	

Sida cunninghamii	
**Sida rhombifolia*	Paddy's Lucerne

Meliaceae

Melia azedarach	White Cedar
Toona ciliata	Red Cedar

Menispermaceae

Sarcopetalum harveyanum	Pearl Vine
Stephania japonica var. *discolor*	Snake Vine

Monimiaceae

Doryphora sassafras	Sassafras
Hedycarya angustifolia	Native Mulberry

Moraceae

Ficus coronata	Creek Sandpaper Fig
Ficus rubiginosa	Port Jackson Fig, Rusty Fig
Maclura cochinchinensis	Cockspur Thorn

Myoporaceae

Eremophila debilis	Amulla
Myoporum insulare	Boobialla
Myoporum montanum	Western Boobialla

Myrsinaceae

Rapanea howittiana	Brush Muttonwood
Rapanea variabilis	Muttonwood

Myrtaceae

Acmena smithii	Lilly Pilly
Angophora costata	Sydney Red/Rusty Gum
Angophora floribunda	Rough-barked Apple
Babingtonia cunninghamii	
Babingtonia densifolia	
Babingtonia pluriflora	
Backhousia myrtifolia	Grey Myrtle
Baeckea brevifolia	
Baeckea imbricata	
Baeckea linifolia	
Baeckea utilis	Mountain Baeckea
Callistemon citrinus	Crimson Bottlebrush
Callistemon pityoides	Alpine Bottlebrush
Callistemon salignus	Willow Bottlebrush
Callistemon sieberi	River Bottlebrush
Calytrix tetragona	
Corymbia gummifera	Red Bloodwood
Corymbia tessellaris	Carbeen
Darwinia fascicularis subsp. *oligantha*	
Darwinia taxifolia subsp. *taxifolia*	
Eucalyptus acmenoides	White Mahogany
Eucalyptus agglomerata	Blue-leaved Stringybark
Eucalyptus aggregata	Black Gum
Eucalyptus albens	White Box
Eucalyptus albens x moluccana	
Eucalyptus apiculata	
Eucalyptus bensonii	
Eucalyptus beyeriana	
Eucalyptus bicostata	Eurabbie
Eucalyptus blakelyi	Blakely's Red Gum
Eucalyptus blaxlandii	Brown Stringybark
Eucalyptus bosistoana	Coast Grey Gum
Eucalyptus bridgesiana	Apple Box
Eucalyptus camphora	Broad-leaved Sally
Eucalyptus cannonii	
Eucalyptus consideniana	Yertchuk
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus cypellocarpa	Monkey Gum
Eucalyptus dalrympleana subsp. *dalrympleana*	Mountain Gum
Eucalyptus dawsonii	Slaty Gum
Eucalyptus dealbata	Tumbledown Red Gum
Eucalyptus deanei	Mountain Blue Gum
Eucalyptus dives	Broad-leaved Peppermint
Eucalyptus elata	River Peppermint
Eucalyptus eugenioides	Thin-leaved Stringybark
Eucalyptus fastigata	Brown Barrel
Eucalyptus fibrosa	Red Ironbark
Eucalyptus globoidea	White Stringybark
Eucalyptus goniocalyx	Bundy
Eucalyptus gregsoniana	Wolgan Snow Gum
Eucalyptus laevopinea	Silver-top Stringybark
Eucalyptus laophila	
Eucalyptus latiuscula	
Eucalyptus ligustrina	Privet-leaved Stringybark
Eucalyptus macrorhyncha	Red Stringybark
Eucalyptus mannifera subsp. *gullickii*	
Eucalyptus mannifera subsp. *mannifera*	Brittle Gum
Eucalyptus melliodora	Yellow Box
Eucalyptus moluccana	Grey Box
Eucalyptus multicaulis	Whipstick Ash
Eucalyptus notabilis	Mountain Mahogany
Eucalyptus nubila	Blue-leaved Ironbark
Eucalyptus obliqua	Messmate
Eucalyptus oblonga	Stringybark
Eucalyptus oreades	Blue Mountains Ash
Eucalyptus ovata	Swamp Gum
Eucalyptus pauciflora	White Sally
Eucalyptus piperita	Sydney Peppermint
Eucalyptus polyanthemos	Red Box
Eucalyptus praecox	Brittle Gum

Eucalyptus pulverulenta	Silver-leaved Gum
Eucalyptus punctata	Grey Gum
Eucalyptus radiata	Narrow-leaved Peppermint
Eucalyptus rossii	Inland Scribbly Gum
Eucalyptus rubida subsp. *rubida*	Candlebark
Eucalyptus saligna	Sydney Blue Gum
Eucalyptus sclerophylla	Hard-leaved Scribbly Gum
Eucalyptus sideroxylon	Mugga Ironbark
Eucalyptus sieberi	Silvertop Ash
Eucalyptus smithii	Ironbark Peppermint
Eucalyptus sparsifolia	Narrow-leaved Stringybark
Eucalyptus stellulata	Black Sally
Eucalyptus stricta	Mallee Ash
Eucalyptus tenella	Stringybark
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus viminalis	Ribbon Gum
Euryomyrtus ramosissima	Rosy Baeckea
Kunzea ambigua	Tick Bush
Kunzea cambagei	
Kunzea capitata	
Kunzea obovata	
Kunzea parvifolia	
Kunzea sp. 'Mt Cookem'	
Kunzea species D	
Kunzea spp.	
Leptospermum arachnoides	
Leptospermum blakelyi	
Leptospermum brevipes	
Leptospermum continentale	Prickly Teatree
Leptospermum grandifolium	Woolly Teatree
Leptospermum juniperinum	Prickly Tea-tree
Leptospermum lanigerum	Woolly Teatree
Leptospermum macrocarpum	
Leptospermum micromyrtus	
Leptospermum morrisonii	
Leptospermum multicaule	
Leptospermum myrtifolium	
Leptospermum obovatum	
Leptospermum parvifolium	
Leptospermum polyanthum	
Leptospermum polygalifolium	
Leptospermum rupicola	
Leptospermum sphaerocarpum	
Leptospermum squarrosum	
Leptospermum trinervium	
Melaleuca erubescens	
Melaleuca hypericifolia	
Melaleuca linariifolia	
Melaleuca styphelioides	Prickly-leaved Tea Tree
Micromyrtus ciliata	
Ochrosperma oligomerum	
Syncarpia glomulifera	Turpentine
Tristania neriifolia	Water Gum
Tristaniopsis collina	Mountain Water Gum
Tristaniopsis laurina	Kanuka

Olacaceae

Olax stricta	

Oleaceae

**Ligustrum lucidum*	Large-leaved Privet
**Ligustrum sinense*	Small-leaved Privet
Notelaea longifolia forma *intermedia*	
Notelaea longifolia forma *longifolia*	Large Mock-olive
Notelaea neglecta	
Notelaea venosa	Veined Mock-olive

Onagraceae

Epilobium billardiereanum subsp. *billardiereanum*	
Epilobium billardiereanum subsp. *cinereum*	
Epilobium billardiereanum subsp. *hydrophilum*	
Epilobium gunnianum	
Epilobium hirtigerum	
Epilobium pallidiflorum	
**Oenothera drummondii*	

Oxalidaceae

Oxalis chnoodes	
**Oxalis corniculata*	Creeping Oxalis
Oxalis exilis	
Oxalis perennans	
**Oxalis pes-caprae*	Soursob
**Oxalis purpurea*	
Oxalis radicosa	
**Oxalis thompsoniae*	

Passifloraceae

Passiflora cinnabarina	Red Passionfruit
**Passiflora edulis*	Common Passionfruit
Passiflora herbertiana subsp. *herbertiana*	Native Passionfruit

Phytolaccaceae

**Phytolacca americana*	Pokeweed
**Phytolacca octandra*	Inkweed

Pittosporaceae

Billardiera scandens var. scandens	Appleberry
Bursaria longisepala	
Bursaria spinosa subsp. lasiophylla	
Bursaria spinosa subsp. spinosa	Native Blackthorn

Pittosporum multiflorum	Orange Thorn
Pittosporum revolutum	Rough Fruit Pittosporum
Pittosporum undulatum	Sweet Pittosporum
Rhytidosporum procumbens	

Plantaginaceae

Plantago antarctica	
Plantago cunninghamii	
Plantago debilis	
Plantago gaudichaudii	
Plantago hispida	
**Plantago lanceolata*	Lamb's Tongues
**Plantago major*	Large Plantain
Plantago varia	

Polygalaceae

Comesperma ericinum	
Comesperma sphaerocarpum	
Comesperma volubile	
Polygala japonica	
**Polygala myrtifolia*	

Polygonaceae

**Acetosella vulgaris*	Sorrel, Sheep Sorrel
**Emex australis*	Spiny Emex
Muehlenbeckia adpressa	Climbing Lignum
Muehlenbeckia axillaris	
Muehlenbeckia rhyticarya	
Persicaria decipiens	Slender Knotweed
Persicaria hydropiper	Water Pepper
Persicaria lapathifolia	Pale Knotweed
Persicaria praetermissa	
**Persicaria strigosa*	
Rumex brownii	Swamp Dock
**Rumex crispus*	Curled Dock
Rumex dumosus	Wiry Dock

Portulacaceae

Calandrinia calyptrata	
Montia fontana subsp. *chondrosperma*	

Primulaceae

**Anagallis arvensis*	Scarlet/Blue Pimpernel

Proteaceae

Banksia cunninghamii subsp. *cunninghamii*	
Banksia ericifolia subsp. *ericifolia*	Heath-leaved Banksia
Banksia marginata	Silver Banksia
Banksia paludosa	
Banksia penicillata	
Banksia serrata	Old-man Banksia
Banksia spinulosa var. collina	
Banksia spinulosa var. spinulosa	Hairpin Banksia
Conospermum ellipticum	
Conospermum ericifolium	
Conospermum taxifolium	
Grevillea acanthifolia subsp. acanthifolia	
Grevillea alpina	
Grevillea arenaria subsp. *arenaria*	
Grevillea buxifolia subsp. *buxifolia*	Grey Spider Flower
Grevillea imberbis	
Grevillea laurifolia	Laurel-leaf Grevillea
Grevillea linearifolia	
Grevillea mucronulata	
Grevillea phylicoides	
Grevillea ramosissima subsp. *ramosissima*	Fan Grevillea
Grevillea sericea subsp. *sericea*	
Grevillea stenobotrya	
Grevillea triternata	
Hakea dactyloides	Finger Hakea, Broad-leaved Hakea
Hakea decurrens subsp. *decurrens*	
Hakea dohertyi	
Hakea laevipes subsp. *laevipes*	
Hakea microcarpa	Small-fruited Hakea
Hakea propinqua	
Hakea salicifolia	Willow-leaved Hakea
Hakea sericea	Needlebush
Hakea teretifolia	
Isopogon anemonifolius	Borad-leaf Drumsticks
Isopogon anethifolius	
Isopogon dawsonii	
Isopogon prostratus	
Lambertia formosa	Mountain Devil
Lomatia arborescens	
Lomatia ilicifolia	
Lomatia myricoides	River Lomatia
Lomatia silaifolia	Crinkle Bush
Persoonia acuminata	
Persoonia chamaepeuce	
Persoonia chamaepitys	Mountain Geebung
Persoonia lanceolata	
Persoonia laurina subsp. *intermedia*	
Persoonia laurina subsp. *laurina*	
Persoonia laurina subsp. *leiogyna*	
Persoonia levis	Broad-leaved Geebung
Persoonia linearis	Narrow-leaved Geebung
Persoonia marginata	
Persoonia microphylla	
Persoonia mollis subsp. *mollis*	
Persoonia myrtilloides subsp. *cunninghamii*	

Persoonia myrtilloides subsp. *myrtilloides*	
Persoonia nutans	
Persoonia oblongata	
Persoonia oxycoccoides	
Persoonia rigida	
Persoonia sericea	
Petrophile canescens	
Petrophile pedunculata	
Petrophile pulchella	Conesticks
Stenocarpus salignus	Scrub Beefwood
Symphionema montanum	
Symphionema paludosum	
Telopea speciosissima	Waratah
Xylomelum pyriforme	Woody Pear

Ranunculaceae

Clematis aristata	Old Man's Beard
Clematis glycinoides var. *glycinoides*	Headache Vine
Clematis microphylla var. *microphylla*	
Ranunculus inundatus	
Ranunculus lappaceus	Common Buttercup
Ranunculus plebeius	
**Ranunculus repens*	Creeping Buttercup

Rhamnaceae

Cryptandra amara var. *amara*	Bitter cryptandra
Cryptandra amara var. *floribunda*	
Cryptandra ericoides	
Cryptandra propinqua	
Cryptandra spinescens	
Pomaderris andromedifolia subsp. *andromedifolia*	
Pomaderris angustifolia	
Pomaderris aspera	Hazel Pomaderris
Pomaderris betulina subsp. *betulina*	
Pomaderris brunnea	
Pomaderris cotoneaster	
Pomaderris elliptica subsp. elliptica	
Pomaderris eriocephala	
Pomaderris ferruginea	
Pomaderris intermedia	
Pomaderris ledifolia	
Pomaderris phylicifolia subsp. *ericoides*	
Pomaderris phylicifolia subsp. *phylicifolia*	
Pomaderris prunifolia var. *prunifolia*	
Pomaderris velutina	

Rosaceae

Acaena agnipila	
Acaena echinata	
Acaena novae-zelandiae	Bidgee-widgee, Biddy Biddy
Acaena ovina	
**Pyrus communis*	Common Pear
**Rosa rubiginosa*	Sweet Briar
**Rubus discolor*	Blackberry
**Rubus fruticosus* sp. agg.	Blackberry complex
**Rubus leightonii*	Blackberry
**Rubus moluccanus*	
Rubus moluccanus var. *trilobus*	Molucca Bramble
Rubus nebulosus	Green-leaved Bramble
Rubus parvifolius	Native Raspberry
Rubus rosifolius	Rose-leaf Bramble
**Rubus ulmifolius*	Blackberry
**Sanguisorba minor* subsp. *muricata*	Sheep's Burnet

Rubiaceae

Asperula conferta	Common Woodruff
Asperula cunninghamii	Twining Woodruff
Asperula gunnii	Mountain Woodruff
Asperula scoparia	Prickly Woodruff
Canthium coprosmoides	Coast Canthium
Coprosma hirtella	
Coprosma quadrifida	Prickly Currant Bush
Galium australe	Tangled Bedstraw
Galium binifolium	
Galium gaudichaudii	Rough Bedstraw
Galium liratum	
Galium migrans	
**Galium murale*	Small Bedstraw
Galium propinquum	Maori Bedstraw
Morinda jasminoides	Sweet Morinda
Nertera granadensis	
Opercularia aspera	Coarse Stinkweed
Opercularia diphylla	
Opercularia hispida	Hairy Stinkweed
Opercularia varia	Variable Stinkweed
Pomax umbellata	
**Richardia humistrata*	
**Richardia stellaris*	

Rutaceae

Boronia anemonifolia var. *anemonifolia*	
Boronia deanei	
Boronia floribunda	Pale-pink Boronia
Boronia ledifolia	Sydney Boronia
Boronia microphylla	Small-leaved Boronia
Boronia rigens	
Boronia rubiginosa	
Correa reflexa var. *reflexa*	Native Fuschia
Correa reflexa var. *speciosa*	
Crowea spp.	

Melicope micrococca	Hairy-leaved Doughwood
Nematolepis squamea subsp. *squamea*	Satinwood
Phebalium bifidum	
Phebalium squamulosum	Scaly Phebalium
Phebalium squamulosum subsp. *gracile*	
Phebalium squamulosum subsp. *ozothamnoides*	Alpine Phebalium
Phebalium squamulosum subsp. *squamulosum*	
Philotheca hispidula	
Philotheca myoporoides subsp. *myoporoides*	
Philotheca obovalis	
Philotheca salsolifolia	
Zieria adenodonta	
Zieria arborescens subsp. *arborescens*	Stinkwood
Zieria aspalathoides	
Zieria cytisoides	Downy Zieria
Zieria fraseri subsp. *compacta*	
Zieria laevigata	
Zieria pilosa	
Zieria robusta	
Zieria spp.	

Salicaceae

**Salix babylonica*	Weeping Willow
**Salix fragilis* var. *fragilis*	Crack Willow
**Salix nigra*	Black Willow

Sambucaceae

Sambucus australasica	Native Elderberry
Sambucus gaudichaudiana	White Elderberry

Santalaceae

Choretrum candollei	White Sour Bush
Choretrum glomeratum	Common Sour Bush
Choretrum pauciflorum	Dwarf Sour Bush
Choretrum species A	
Exocarpos cupressiformis	Native Cherry
Exocarpos strictus	Dwarf Cherry
Leptomeria acida	Sour Currant Bush
Omphacomeria acerba	
Santalum obtusifolium	Sandalwood

Sapindaceae

Alectryon subcinereus	Wild Quince
Dodonaea boroniifolia	
Dodonaea lanceolata var. *subsessilifolia*	
Dodonaea multijuga	
Dodonaea sinuolata subsp. *sinuolata*	
Dodonaea triangularis	
Dodonaea triquetra	Large-leaf Hop-bush
Dodonaea truncatiales	
Dodonaea viscosa	
Dodonaea viscosa subsp. *angustifolia*	
Dodonaea viscosa subsp. *angustissima*	
Dodonaea viscosa subsp. *cuneata*	
Dodonaea viscosa subsp. *spatulata*	
Elattostachys nervosa	Green Tamarind

Scrophulariaceae

Bacopa monnieri	
Derwentia blakelyi	
Derwentia derwentiana subsp. *derwentiana*	
Derwentia derwentiana subsp. *subglauca*	
Derwentia perfoliata	Digger's Speedwell
Euphrasia collina subsp. paludosa	
Gratiola pedunculata	
Gratiola peruviana	
**Mimulus moschatus*	Musk Monkey-flower
Parahebe lithophila	
**Verbascum blattaria*	Moth Mullein
**Verbascum thapsus* subsp. *thapsus*	Blanket Weed
**Verbascum virgatum*	Twiggy Mullein
**Veronica anagallis-aquatica*	Blue Water-speedwell
Veronica brownii	
Veronica calycina	Hairy Speedwell
Veronica notabilis	
**Veronica peregrina*	Wandering Speedwell
Veronica plebeia	Trailing Speedwell
Veronica species A	

Solanaceae

**Capsicum frutescens*	
Duboisia myoporoides	Corkwood
Nicotiana suaveolens	Native Tobacco
**Physalis peruviana*	Cape Gooseberry
Solanum americanum	Glossy Nightshade
Solanum aviculare	Kangaroo Apple
Solanum brownii	Violet Nightshade
Solanum campanulatum	
**Solanum chenopodioides*	Whitetip Nightshade
Solanum cinereum	Narrawa Burr
Solanum elegans	Spiny Kangaroo Apple
**Solanum nigrum*	Black-berry Nightshade
Solanum opacum	Green-berry Nightshade
Solanum prinophyllum	Forest Nightshade
**Solanum pseudocapsicum*	Madeira Winter Cherry
Solanum pungetium	Eastern Nightshade
Solanum stelligerum	Devil's Needles

Stackhousiaceae

Stackhousia monogyna	Creamy Candles

Stackhousia viminea	Slender Stackhousia

Sterculiaceae

Brachychiton populneus	Kurrajong
Brachychiton populneus subsp. *populneus*	
Lasiopetalum ferrugineum var. *cordatum*	
Lasiopetalum macrophyllum	
Lasiopetalum parviflorum	

Stylidiaceae

Stylidium eglandulosum	Woolly-stemmed Triggerplant
Stylidium graminifolium	Grass Triggerplant
Stylidium laricifolium	Tree Triggerplant
Stylidium lineare	Narrow-leaved Triggerplant
Stylidium productum	

Thymelaeaceae

Pimelea curviflora var. *gracilis*	
Pimelea curviflora var. *sericea*	
Pimelea curviflora var. *subglabrata*	
Pimelea glauca	
Pimelea latifolia subsp. *elliptifolia*	
Pimelea latifolia subsp. *hirsuta*	
Pimelea ligustrina subsp. *ligustrina*	
Pimelea linifolia subsp. caesia	
Pimelea linifolia subsp. collina	
Pimelea linifolia subsp. linifolia	
Pimelea linifolia subsp. linoides	

Tremandraceae

Tetratheca bauerifolia	
Tetratheca ericifolia	
Tetratheca juncea	
Tetratheca neglecta	
Tetratheca rubioides	
Tetratheca rupicola	
Tetratheca thymifolia	Black-eyed Susan

Ulmaceae

Trema tomentosa var. *viridis*	Native Peach

Urticaceae

Australina pusilla	
Dendrocnide excelsa	Giant Stinging Tree
Elatostema reticulatum	
Parietaria debilis	Native Pellitory
Urtica incisa	Stinging Nettle
**Urtica urens*	Small Nettle

Valerianaceae

**Centranthus ruber*	

Verbenaceae

Clerodendrum tomentosum	Hairy Clerodendrum, Downy Chance Tree
**Verbena bonariensis*	Purpletop
**Verbena officinalis*	Common Verbena
**Verbena rigida*	Veined Verbena

Violaceae

Hybanthus monopetalus	Slender Violet-bush
Hybanthus vernonii subsp. *scaber*	
Hybanthus vernonii subsp. *vernonii*	
Hymenanthera dentata	Tree Violet
Viola betonicifolia subsp. *betonicifolia*	
Viola caleyana	Swamp Violet
Viola fuscoviolacea	
Viola hederacea	Ivy-leaved Violet
Viola sieberiana	

Viscaceae

Notothixos cornifolius	Kurrajong Mistletoe

Vitaceae

Cayratia clematidea	Slender Grape
Cissus antarctica	Water Vine
Cissus hypoglauca	Giant Water Vine
Cissus opaca	Small-leaved Water Vine

Winteraceae

Tasmannia insipida	Brush Pepperwood
Tasmannia lanceolata	Mountain Pepperbush

ANGIOSPERMAE

Monocotyledonae

Alismataceae

Alisma plantago-aquatica	Water Plantain

Anthericaceae

Arthropodium milleflorum	Vanilla Lily

Arthropodium minus	Small Vanilla Lily
Arthropodium species B	
Caesia parviflora	Pale Grass-lily
Dichopogon fimbriatus	Nodding Chocolate Lily
Dichopogon strictus	Chocolate Lily
Laxmannia gracilis	Slender Wire Lily
Sowerbaea juncea	Vanilla Plant
Thysanotus juncifolius	
Thysanotus patersonii	Twining Fringe-Lily
Thysanotus tuberosus	Common Fringe-lily
Tricoryne elatior	Yellow Autumn-lily

Araceae

Gymnostachys anceps	Settler's Flax

Asphodelaceae

Bulbine bulbosa	Bulbine Lily
Bulbine glauca	Rock Lily
Bulbine semibarbata	Wild Onion
Bulbine spp.	

Colchicaceae

Burchardia umbellata	Milkmaids
Wurmbea dioica subsp. *dioica*	Early Nancy

Commelinaceae

Aneilema acuminatum	
Aneilema biflorum	
Commelina cyanea	Native Wandering Jew
Murdannia graminea	
**Tradescantia fluminensis*	Wandering Jew

Cyperaceae

Baumea acuta	
Baumea rubiginosa	
Carex appressa	Tall Sedge
Carex breviculmis	
Carex brunnea	
Carex fascicularis	Tassel Sedge
Carex gaudichaudiana	
Carex incomitata	
Carex inversa	Knob Sedge
Carex iynx	
Carex longebrachiata	Bergalia Tussock
Carex polyantha	
Carex spp.	
Caustis flexuosa	Curly Wig
Caustis pentandra	
Caustis recurvata var. *recurvata*	
Cyathochaeta diandra	
**Cyperus eragrostis*	Umbrella Sedge
Cyperus fulvus	
Cyperus gracilis	
Cyperus laevis	
Cyperus lucidus	
Cyperus sphaeroideus	
Cyperus spp.	
Eleocharis acuta	
Eleocharis sphacelata	Tall Spike Rush
Eleocharis spp.	
Fimbristylis dichotoma	Common Fridge-sedge
Gahnia aspera	Rough Saw-sedge
Gahnia clarkei	Tall Saw-sedge
Gahnia erythrocarpa	
Gahnia filifolia	
Gahnia melanocarpa	
Gahnia microstachya	
Gahnia radula	
Gahnia sieberiana	
Gahnia spp.	
Gahnia subaequiglumis	
Gymnoschoenus sphaerocephalus	
Isolepis cernua	Nodding Club-rush
Isolepis fluitans	Floating Club-rush
Isolepis gaudichaudiana	
Isolepis habra	
Isolepis inundata	
Isolepis nodosa	Knobby Club-rush
**Isolepis prolifera*	
Isolepis spp.	
Lepidosperma concavum	
Lepidosperma elatius	
Lepidosperma evansianum	
Lepidosperma filiforme	
Lepidosperma forsythii	
Lepidosperma gunnii	
Lepidosperma latens	
Lepidosperma laterale	
Lepidosperma limicola	
Lepidosperma longitudinale	
Lepidosperma neesii	
Lepidosperma spp.	
Lepidosperma tortuosum	
Lepidosperma urophorum	
Lepidosperma viscidum	
Ptilothrix deusta	
Schoenoplectus spp.	
Schoenoplectus validus	
Schoenus apogon	Fluke Bogrush
Schoenus brevifolius	

Schoenus ericetorum	
Schoenus imberbis	
Schoenus lepidosperma	
Schoenus melanostachys	
Schoenus moorei	
Schoenus spp.	
Schoenus turbinatus	
Schoenus villosus	
Tetraria capillaris	
Tricostularia pauciflora	

Haemodoraceae

Haemodorum corymbosum	
Haemodorum planifolium	
Haemodorum tenuifolium	

Hypoxidaceae

Hypoxis hygrometrica	Golden Weather-grass

Iridaceae

Libertia paniculata	
Libertia pulchella	
Patersonia fragilis	
Patersonia glabrata	
Patersonia longifolia	
Patersonia sericea	Silky Purple-Flag

Juncaceae

**Juncus acuminatus*	
Juncus alexandri subsp. *alexandri*	
Juncus alexandri subsp. *melanobasis*	
**Juncus articulatus*	
**Juncus bufonius*	Toad Rush
Juncus caespiticius	
Juncus continuus	
Juncus falcatus	
Juncus filicaulis	
Juncus flavidus	
Juncus holoschoenus	
Juncus homalocaulis	
Juncus laeviusculus subsp. *illawarrensis*	
Juncus laeviusculus subsp. *laeviusculus*	
Juncus ochrocoleus	
Juncus pauciflorus	
Juncus planifolius	
Juncus procerus	
Juncus sarophorus	
Juncus spp.	
Juncus usitatus	
Luzula densiflora	
Luzula flaccida	
Luzula meridionalis	
Luzula modesta	
Luzula ovata	
Luzula spp.	

Lomandraceae

Lomandra brevis	
Lomandra confertifolia subsp. *confertifolia*	
Lomandra confertifolia subsp. *pallida*	
Lomandra confertifolia subsp. *rubiginosa*	
Lomandra cylindrica	
Lomandra filiformis subsp. *coriacea*	
Lomandra filiformis subsp. *filiformis*	Wattle Matt-rush
Lomandra filiformis subsp. *flavior*	
Lomandra fluviatilis	
Lomandra glauca	Pale Mat-rush
Lomandra gracilis	
Lomandra hystrix	
Lomandra longifolia	Spiny-headed Mat-rush
Lomandra micrantha subsp. *tuberculata*	Small-flowered Mat-rush
Lomandra montana	
Lomandra multiflora subsp. *multiflora*	Many-flowered Mat-rush
Lomandra obliqua	

Luzuriagaceae

Eustrephus latifolius	Wombat Berry
Geitonoplesium cymosum	Scrambling Lily

Orchidaceae

Acianthus apprimus	
Acianthus collinus	
Acianthus exsertus	Mosquito Orchid
Acianthus fornicatus	Pixie Caps
Acianthus pusillus	Gnat Orchid
Bulbophyllum exiguum	
Caladenia carnea	Pink Fingers
Caladenia catenata	White Caladenia
Caladenia dimorpha	
Caladenia gracilis	Musky Caladenia
Caleana major	Large Duck Orchid
Caleana minor	Small Duck Orchid
Calochilus paludosus	Red Beard Orchid
Calochilus robertsonii	Purplish Beard Orchid
Calochilus spp.	
Chiloglottis diphylla	
Chiloglottis formicifera	Ant Orchid
Chiloglottis pluricallata	
Chiloglottis reflexa	
Chiloglottis spp.	

Chiloglottis trapeziformis	
Chiloglottis trilabra	
Chiloglottis valida	Large Bird Orchid
Corybas aconitiflorus	Spurred Helmet Orchid
Corybas hispidus	Bristly Helmet Orchid
Corybas spp.	
Cryptostylis erecta	Tartan Tongue Orchid
Cryptostylis leptochila	Small Tongue Orchid
Cryptostylis subulata	Large Tongue Orchid
Cyanicula caerulea	Blue Caladenia
Cymbidium suave	Snake Orchid
Cyrtostylis reniformis	Gnat Orchid
Dendrobium aemulum	Ironbark Orchid
Dendrobium fairfaxii	Bridal Veil Orchid
Dendrobium linguiforme	Tongue Orchid
Dendrobium speciosum	Rock Lily
Dendrobium striolatum	Pencil Orchid
Dendrobium teretifolium	
Dipodium punctatum	Pink Hyacinth Orchid
Dipodium roseum	
Dipodium spp.	
Diuris alba	
Diuris aurea	
Diuris maculata	Spotted Doubletail
Diuris platichila	
Diuris spp.	
Diuris sulphurea	Tiger/Hornet Orchid
Eriochilus cucullatus	Parson's Bands
Gastrodia sesamoides	Cinnamon Bells
Genoplesium nudiscapum	Dense Midge Orchid
Genoplesium pumilum	Green Midge Orchid
Genoplesium rufum	Red Midge Orchid
Genoplesium spp.	
Glossodia major	Waxlip Orchid
Liparis reflexa	
Microtis spp.	
Microtis unifolia	Common Onion Orchid
Orthoceras strictum	Horned/Bird's-mouth Orchid
Plectorrhiza tridentata	Tangle Orchid
Prasophyllum flavum	Yellow Leek Orchid
Pterostylis abrupta	
Pterostylis bicolor	
Pterostylis coccina	
Pterostylis concinna	Trim Greenhood
Pterostylis curta	Blunt Greenhood
Pterostylis decurva	Summer Grasshood
Pterostylis fischii	
Pterostylis grandiflora	Cobra Greenhood
Pterostylis laxa	
Pterostylis longifolia	Tall Greenhood
Pterostylis longipetala	
Pterostylis mutica	Midget Greenhood
Pterostylis nana	Dwarf Greenhood
Pterostylis nutans	Nodding Greenhood
Pterostylis obtusa	
Pterostylis ophioglossa	Snake Tongue Greenhood
Pterostylis parviflora	Tiny Greenhood
Pterostylis pedunculata	Maroonhood
Pterostylis reflexa	
Pterostylis rufa	Rusty Hood
Pterostylis species B	
Pterostylis spp.	
Pterostylis truncata	Little Dumplings
Sarcochilus australis	Butterfly Orchid
Sarcochilus falcatus	Orange Blossom Orchid
Sarcochilus hillii	Pink Shell Orchid
Spiranthes sinensis subsp. *australis*	Ladies Tresses
Thelymitra ixioides var. *ixioides*	Dotted Sun Orchid
Thelymitra nuda	Plain Sun Orchid
Thelymitra pauciflora	Slender Sun Orchid
Thelymitra pulchella	
Thelymitra spp.	
Thelymitra venosa	Large Veined Sun Orchid

Philydraceae

Philydrum lanuginosum	Frogsmouth

Phormiaceae

Dianella brevipedunculata	
Dianella caerulea var. *assera*	
Dianella caerulea var. *caerulea*	Blue Flax-lily
Dianella caerulea var. *cinerascens*	
Dianella caerulea var. *producta*	
Dianella caerulea var. *vannata*	
Dianella longifolia var. *longifolia*	
Dianella prunina	
Dianella revoluta var. *revoluta*	
Dianella spp.	
Dianella tasmanica	
Stypandra glauca	Nodding Blue Lily
Thelionema caespitosum	
Thelionema umbellatum	

Poaceae

Agrostis bettyae	
**Aira caryophyllea*	Silvery Hairgrass
**Aira cupaniana*	Silvery Hairgrass
**Aira elegantissima*	Delicate Hairgrass
**Aira provincialis*	
Amphipogon strictus var. *strictus*	Greybeard Grass

Anisopogon avenaceus	Oat Speargrass
**Anthoxanthum odoratum*	Sweet Vernal Grass
Aristida calycina	
Aristida caput-medusae	Many-headed Wiregrass
Aristida jerichoensis var. jerichoensis	
Aristida ramosa var. *ramosa*	Purple Wiregrass
Aristida ramosa var. *speciosa*	
Aristida vagans	Threeawn Speargrass
Aristida warburgii	
Austrodanthonia bipartita	
Austrodanthonia caespitosa	Ringed Wallaby Grass
Austrodanthonia eriantha	
Austrodanthonia fulva	Wallaby Grass
Austrodanthonia laevis	
Austrodanthonia monticola	
Austrodanthonia penicillata	Slender Wallaby Grass
Austrodanthonia pilosa	Smooth-flowered Wallaby Grass
Austrodanthonia racemosa var. obtusata	
Austrodanthonia racemosa var. racemosa	
Austrodanthonia richardsonii	Wallaby Grass
Austrodanthonia setacea	
Austrodanthonia tenuior	
Austrofestuca eriopoda	Snow Fescue
Austrostipa densiflora	
Austrostipa drummondii	
Austrostipa mollis	Speargrass
Austrostipa nivicola	
Austrostipa nodosa	
Austrostipa pubescens	
Austrostipa ramosissima	Stout Bamboo Grass
Austrostipa rudis subsp. *nervosa*	
Austrostipa rudis subsp. *rudis*	
Austrostipa scabra subsp. falcata	
Austrostipa scabra subsp. *scabra*	Speargrass
Austrostipa setacea	Corkscrew Grass
Austrostipa stipoides	
Austrostipa verticillata	Slender Bamboo Grass
**Avena fatua*	Wild Oats
Bothriochloa decipiens	Red Grass
Bothriochloa macra	Red Grass
**Briza maxima*	Quaking Grass
**Briza minor*	Shivery Grass
**Bromus catharticus*	Praire Grass
**Bromus diandrus*	Great Brome
**Bromus molliformis*	
**Bromus racemosus*	Smooth Brome
Cenchrus caliculatus	Hillside Burrgrass
Chloris truncata	Windmill Grass
Chloris ventricosa	Tall Chloris
Cymbopogon obtectus	Silky Heads
Cymbopogon refractus	Barbed Wire Grass
Cynodon dactylon	Common Couch
**Cynosurus echinatus*	Rough Dog's Tail
**Dactylis glomerata*	Cocksfoot
Danthonia spp.	Wallaby Grass
Deyeuxia brachyathera	
Deyeuxia gunniana	
Deyeuxia microseta	
Deyeuxia monticola var. *monticola*	
Deyeuxia parviseta var. *boormanii*	
Deyeuxia quadriseta	
Deyeuxia rodwayi	
Dichanthium sericeum subsp. *sericeum*	Queensland Bluegrass
Dichelachne crinita	Longhair Plumegrass
Dichelachne hirtella	
Dichelachne inaequiglumis	
Dichelachne micrantha	Shorthair Plumegrass
Dichelachne parva	
Dichelachne rara	
Dichelachne sieberiana	
Digitaria breviglumis	
Digitaria brownii	Cotton Panic Grass
Digitaria diffusa	
Digitaria divaricatissima	Umbrella Grass
Digitaria parviflora	Small-flowered Finger Grass
Digitaria porrecta	
Digitaria ramularis	
Echinopogon caespitosus var. *caespitosus*	Tufted Hedgehog Grass
Echinopogon cheelii	Long-flowered Hedgehog Grass
Echinopogon intermedius	Erect Hedgehog Grass
Echinopogon ovatus var. *ovatus*	Forest Hedgehog Grass
**Ehrharta erecta*	Panic Veldtgrass
Elymus scaber var. *plurinervis*	
Elymus scaber var. *scaber*	Common Wheatgrass
**Elytrigia repens*	English Couch, Quick or Twitch Grass.
Enneapogon gracilis	Slender Nineawn
Entolasia marginata	Bordered Panic
Entolasia stricta	Wiry Panic
Entolasia whiteana	
Eragrostis benthamii	
Eragrostis brownii	Brown's Lovegrass
**Eragrostis curvula*	African Lovegrass
Eragrostis elongata	Clustered Lovegrass
Eragrostis leptostachya	Paddock Lovegrass
Eragrostis molybdea	
Eragrostis parviflora	Weeping Lovegrass
Eragrostis trachycarpa	
**Festuca elatior*	Tall Fescue
Glyceria latispicea	
Hemarthria uncinata	Matgrass

Hemarthria uncinata var. *uncinata*	
**Holcus lanatus*	Yorkshire Fog
**Hordeum spp.*	
Imperata cylindrica var. *major*	Blady Grass
Isachne globosa	Swamp Millet
Joycea pallida	Silvertop Wallaby Grass
Lachnagrostis aemula	Blowngrass
Lachnagrostis filiformis	
**Lagurus ovatus*	Hare's Tail Grass
**Lolium perenne*	Perennial Ryegrass
Lolium spp.	
Microlaena stipoides var. *stipoides*	Weeping Grass
**Nassella trichotoma*	Serrated Tussock
Notochloe microdon	
Notodanthonia longifolia	Long-leaved Wallaby Grass
Oplismenus aemulus	
Oplismenus imbecillis	
Oplismenus spp.	
Panicum decompositum	Native Millet
Panicum effusum	Poison or Hairy Panic
Panicum simile	Two-colour Panic
Panicum spp.	
Paspalidium criniforme	
Paspalidium distans	
Paspalidium gracile	Slender Panic
**Paspalum dilatatum*	Paspalum
Paspalum distichum	Water Couch
**Pennisetum alopecuroides*	Swamp Foxtail
**Pennisetum clandestinum*	Kikuyu Grass
**Pentaschistis airoides*	False Hairgrass
**Phalaris aquatica*	Phalaris
Phragmites australis	Common Reed
Plinthanthesis paradoxa	
Poa affinis	
**Poa annua*	Winter Grass
Poa costiniana	
Poa induta	
Poa labillardierei var. *labillardierei*	Tussock
Poa meionectes	
**Poa pratensis*	Kentucky Bluegrass
Poa sieberiana var. cyanophylla	
Poa sieberiana var. hirtella	
Poa sieberiana var. sieberiana	Snowgrass
Poa spp.	
Poa tenera	
**Polypogon monspeliensis*	Annual Beardgrass
Rytidosperma nudiflorum	
Sarga leiocladum	
**Setaria gracilis*	Slender Pigeon Grass
Sporobolus creber	Slender Rat's Tail Grass
Sporobolus diander	
**Sporobolus indicus*	Parramatta Grass
Sporobolus spp.	
Tetrarrhena juncea	Wiry Ricegrass
Tetrarrhena turfosa	
Themeda australis	Kangaroo Grass
Triodia scariosa subsp. scariosa	Porcupine Grass
**Vulpia bromoides*	Squirrel Tail Fesque
**Vulpia myuros forma megalura*	

Restionaceae

Baloskion australe
Baloskion fimbriatum
Baloskion gracile
Empodisma minus
Leptocarpus tenax
Lepyrodia anarthria
Lepyrodia scariosa
Saropsis fastigiata

Smilacaceae

Smilax australis	Sarsaparilla
Smilax glyciphylla	Sweet Sarsaparilla

Xanthorrhoeaceae

Xanthorrhoea arborea
Xanthorrhoea australis
Xanthorrhoea concava
Xanthorrhoea glauca subsp. angustifolia
Xanthorrhoea johnsonii
Xanthorrhoea latifolia subsp. latifolia
Xanthorrhoea media
Xanthorrhoea minor subsp. minor
Xanthorrhoea resinifera

Xyridaceae

Xyris gracilis
Xyris juncea
Xyris operculata
Xyris ustulata

Department of Environment and Conservation (NSW)