Appendix 4
Vegetation Management Plan

Conacher Environmental Group

June 2008

Warner Industrial Park Concept Plan and Project Application

Precinct 14 WEZ

Sparks Rd and Hue Hue Rd
Warnervale
June 2008

80
TERRACE
TOWER
GROUP

Warner Business Park Pty Ltd
Part of the Terrace Tower Group

Peter Andrews + Associates Pty Ltd
architecture planning urban design

VEGETATION MANAGEMENT PLAN

PROPOSED INDUSTRIAL DEVELOPMENT
PRECINCT 14
WYONG EMPLOYMENT ZONE

JUNE 2008
(REF: 8035V)

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VEGETATION MANAGEMENT PLAN

PROPOSED INDUSTRIAL DEVELOPMENT
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JUNE 2008

Conacher Environmental Group

Environmental and Land Management Consultants

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PREFACE

This Vegetation Management Plan has been prepared by *Conacher Environmental Group* to identify matters in relation to the clearing and management of vegetation proposed to be removed for the proposed industrial development of Precinct 14, within the Wyong Employment Zone. This plan included consideration of the requirements within Wyong Shire Council's Tree Management Development Control Plan (DCP) Number 14 (1999) and DCP Number 49.

This plan pertains only to the lands proposed for development within Precinct 14. A separate management plan has been produced by Wyong Shire Council (2008) for the management of retained vegetation within the riparian, public reserve and open space areas.

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TABLE OF CONTENTS

SECTION 1

INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This Vegetation Management Plan (VMP) has been prepared by *Conacher Environmental Group* to provide details on development works and management of vegetation proposed for removal for the construction of an Industrial development at Precinct 14 within the Wyong Employment Zone. This plan pertains only to the lands proposed for development within Precinct 14. These Drainage / Environmental / Open Space areas will be dedicated to and managed by Wyong Shire Council. A separate management plan has been produced by Wyong Shire Council (2008) for the management of retained vegetation within the riparian, public reserve and open space areas which will be dedicated to, and maintained by, the consent authority.

This VMP applies to the area of the proposed development which will require the removal of some areas of the following vegetation communities:

20aXr Alluvial Floodplain Shrub Swamp Forest (Canopy Only);
28 Narrabeen Buttonderry Footslopes Forest;
28Xr Narrabeen Buttonderry Footslopes Forest (Canopy Only);
28Xs Narrabeen Buttonderry Footslopes Forest (Regrowth);
30 Narrabeen Dooralong Spotted Gum-Ironbark Forest;
30Xr Narrabeen Dooralong Spotted Gum-Ironbark Forest (Regrowth); and
Xr Unspecified Canopy Only.

The purpose of this VMP is to provide details to the Consent Authority in regards to:

- Detail the protection measures for the retained vegetation within the Creek Riparian Corridor and areas of Public Reserve (to be managed according to the WSC 2008 Plan of Management);
- Detail the proposed vegetation removal activities on site;
- Consideration of relevant Bushfire issues;
- Consideration of relevant sediment/erosion control measures.

In preparing this VMP information from various documents or site reports were utilised. Brief details on these are provided below:

1. **Tree Management - Development Control Plan No 14 (Wyong Shire Council, July 2006).**

   It has been identified that a VMP is required in accordance with Figure 1 within DCP N^{o} 14. 'A Vegetation Management Plan comprehensively addresses protection, maintenance, rehabilitation, removal and/or replanting of trees and vegetation on a particular site' (Section 5.1 (a), Wyong Council DCP 14, 2006).

   Section 5.2 (a) of DCP 14 identifies that a VMP will "*provide analysis and a strategy to address issues relating to the staging of the works, cumulative impact, long term vegetation monitoring and management of progressive tree works for the same site over an extended period of time*". These matters are addressed in the following sections of the VMP.

2. **Ecological Investigations (Version 2) (Bell and Murray, 2007). Wyong Employment Zone, Warnervale Business Park, Warnervale Airport Lands, Precincts 11 & 13 and Precinct 14. Report to Wyong Shire Council, 25 May 2007.**

   This report was completed to determine the flora and fauna species, the location and extent of vegetation communities on the site and to provide an assessment in relation to threatened species in accordance with the *Threatened Species Conservation Act (1995)* and the *Environment Protection and Biodiversity Conservation Act (1999).* This report identified that the vegetation on site consists of a number of vegetation types. Details on the flora and vegetation communities present on the site are included in Appendix 1 of this report.

   Four threatened flora species (*Angophora inopina, Grevillea parviflora, Melaleuca biconvexa* and *Tetratheca juncea*) as listed in the *Threatened Species Conservation Act* (1995) and the *Environmental Protection and Biodiversity Conservation Act* (1999) were observed within Precinct 14.

   Two Endangered Ecological Communities (EECs) were observed on-site. These EECs were Swamp Sclerophyll Forest on Coastal Floodplains (SSFCF) and River Flat Eucalypt Forest on Coastal Floodplains (RFEFCF). The majority of these EECs are to be retained within the Buttonderry Creek Riparian Corridor or within the Public Reserves which are to be managed according to the separate Plan of Management produced by WSC (2008).

3. **Wyong Shire Council (2007) Biocertification Report: Wyong Employment Zone (WEZ) Rezoning.**

   This report audits the performance targets with respect to a number of criteria in regards to the management of the WEZ development. This document also provides information on whether the proposed development, plans, strategies and management of the WEZ meets with the requirements of state and federal legislation.

4. **Wyong Shire Council (2008) Wyong Employment Zone Ecological Plan of Management**

   The above Ecological Plan of Management outlines the protection measures and management strategies for the Drainage / Environmental / Open Space lands within the WEZ. This plan covers the retained vegetation located outside of the proposed development area within Precinct 14.

1.2 PROCEDURE FOR PREPARING A VEGETATION MANAGEMENT PLAN

This VMP is the culmination of detailed site investigations, consultations with the client, research and incorporation of information as required by Wyong Shire Council's Development Control Plan No 14 - Vegetation Management and DCP 49.

The following procedures were implemented during the preparation of the VMP:

i. Field survey of site.

ii. Preparation of a Ecological Investigations Report (flora extract in Appendix I).

iii. Provision of recommendations and techniques for the appropriate ecological management of trees and bushland areas during all stages of the proposed development.

The following sections of this VMP identify issues relevant to the staged clearing of vegetation, tree retention and future management of the development site in relation to tree and vegetation management.

Details regarding the dedication, ownership and management of vegetation retained in the Drainage / Environmental / Open Space areas are provided in a separate Wyong Employment Zone Plan of Management which has been prepared by Wyong Council (2008).

1.3 SITE CHARACTERISTICS

This VMP applies to the proposed industrial development area within Precinct 14 of the Wyong Employment Zone (WEZ). This VMP is primarily concerned with activities and procedures which will occur within the development area of Precinct 14. The retained vegetation within the Riparian Corridor associated with Buttonderry Creek and other areas of Open Space and Public Reserve will be managed according to the separate Plan of Management produced by Wyong Shire Council (2008).

The planning and cadastral details of the subject site are provided in Table 1.1 while Table 1.2 summarises the geographical characteristics of the site.

TABLE 1.1
SITE DETAILS

Location	The proposed development is within the Warner Industrial Park and the adjoining lands in Lot 5 DP 259531 and Lot 9 DP 239704 within Precinct 14 of the Wyong Employment Zone, Jilliby. Precinct 14 is bounded by Sparks Road in the south-west, Hue Hue Road to the north-west, Kiar Ridge Road to the north-east and the F3 freeway to the south-east.
Area	Precinct 14 = 129.92 ha Proposed Development Area = 80.98 ha Proposed Open Space / Riparian Areas = 48.94ha
Topographic Maps	Dooralong 1:25000
Grid Reference	353500E 6323200N
Local Government Area	Wyong
Existing Land Use	Rural – Residential
Current Zoning	10 (a) – Investigation Precinct, 7 (g) – Wetlands Management, 6 (a) – Open Space and Recreation
Proposed Development	Industrial development as part of the Wyong Employment Zone – Precinct 14

TABLE 1.2 SITE CHARACTERISTICS	
Elevation	Approximately 17 - 50m AHD
Topography	Undulating low hills and rises, broad crests and ridges with long gentle slopes associated with Buttonderry Creek
Aspect	Various – from south-westerly, south, south-easterly and easterly
Soil Type	Yellow-brown clayey sand, yellow-brown pedal clay and grey massive clays of the Gorokan Soil Landscape, and Deep (>200cm) Yellow Podzolic Soils, Brown Podzolic Soils, Soloths with some Humus Podzols associated with the Wyong Soil Landscape (Murphy 1992).
Catchment	Tuggerah Lake
Drainage	Overland flow into Buttonderry Creek which flows into Porters Wetland which discharges into Wyong River then into Tuggerah Lake.
Vegetation	- Alluvial Floodplain Shrub Swamp Forest - Narrabeen Buttonderry Footslopes Forest - Narrabeen Dooralong Spotted Gum-Ironbark Forest - Alluvial Riparian Blackbutt Forest

1.4 PROPOSED DEVELOPMENT

The proposed development is for an industrial complex as being the Warner Industrial Park which is part of the Wyong Employment Zone (WEZ).

This development will include associated infrastructure such as access, bushfire Asset Protection Zones (APZs) and services. The development is located within the consent authority's proposed industrial zoning (draft LEP) zoned areas within Precinct 14 as shown in Figure 2.

The subject site is known as Precinct 14 which occupies 129.9 hectares within the Wyong Employment Zone. A riparian corridor along Buttonderry Creek and other areas of Open Space and Public Reserve land is to be included and maintained within the proposed Drainage / Environmental / Open Space Lands which total approximately 48.94ha or 37.6% of the site. The Drainage / Environmental / Open Space Lands will be managed according to a separate Plan of Management produced by Wyong Shire Council (2008). The removal of vegetation for the proposed industrial development will be undertaken in accordance with this VMP.

1.5 OTHER MANAGEMENT PLANS FOR RETAINED VEGETATION

This current Vegetation Management Plan addresses the requirements for a vegetation management as identified in Wyong Council DCP N^{o} 14 Tree Management. Areas of Precinct 14 which are proposed to be retained within the Buttonderry Creek Corridor, proposed reserve and corridor areas are not addressed in this VMP. The Buttonderry Creek Corridor is subject to the preparation of a Vegetation Management Plan prepared to address the requirements for preparing Vegetation Management Plans for Controlled Activities under the Water Management Act.

The management of the Buttonderry Creek Corridor is currently detailed in the Wyong Employment Zone Ecological Plan of Management (Draft) prepared for Wyong Shire Council. The Ecological Plan of Management will need to be revised to incorporate any specific requirements identified in the Guidelines for Controlled Activities – Vegetation Management Plans.

Additionally, the Ecological Plan of Management addresses matters regarding the management actions and issues for areas external to the development site within the Precinct 14 lands including open space areas, conservation areas and wildlife corridors.

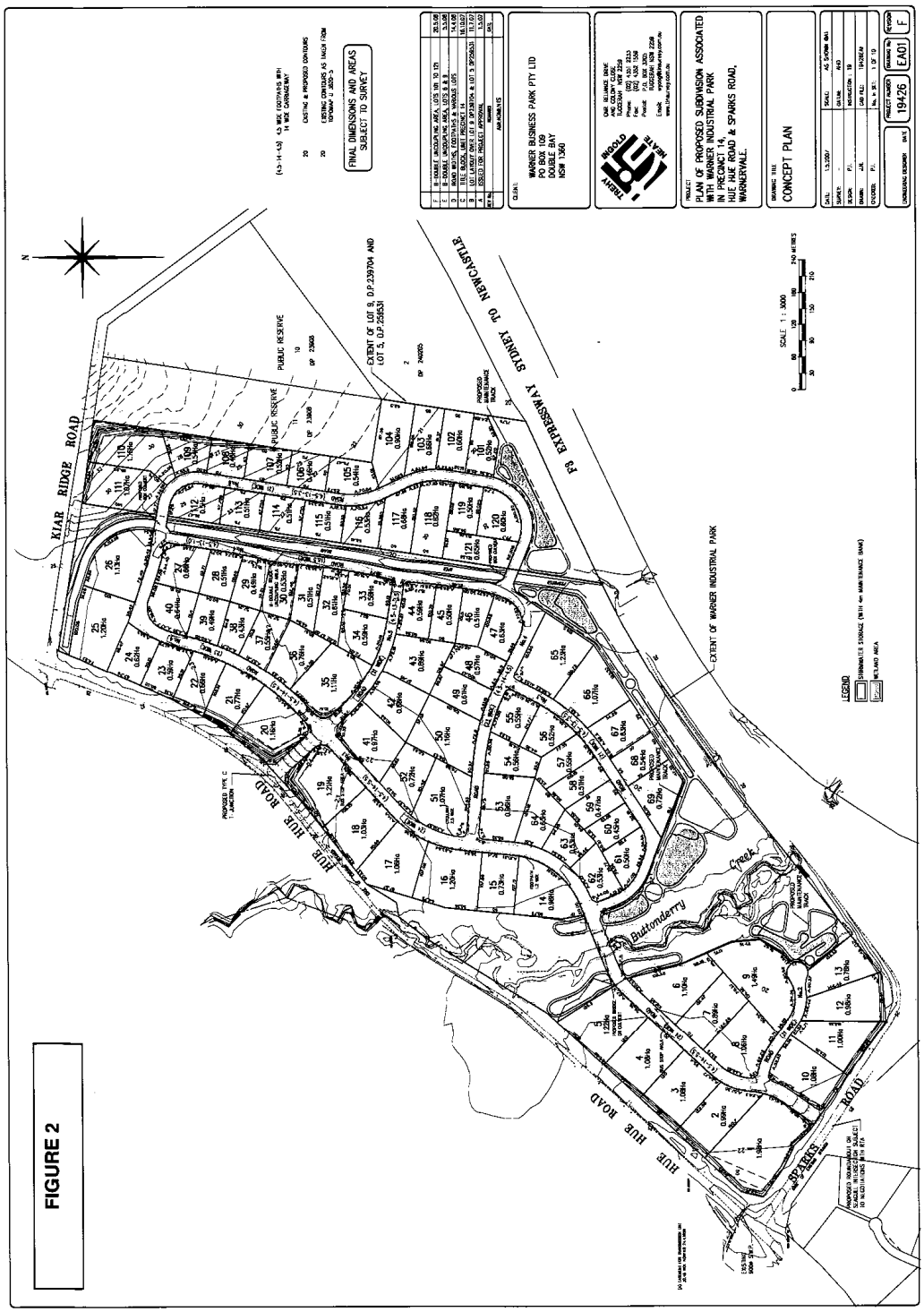
KIAR RIDGE ROAD
HUE HUE ROAD
SPARKS ROAD
P3 EXPRESSWAY
SYDNEY TO NEWCASTLE
PUBLIC RESERVE
EXTENT OF LOT 9, D.P.239704 AND LOT 5, D.P.256531
EXTENT OF WARNER INDUSTRIAL PARK
Butonderry Creek
FINAL DIMENSIONS AND AREAS SUBJECT TO SURVEY
WARNER BUSINESS PARK PTY LTD
PO BOX 109
DOUBLE BAY
NSW 1360
PLAN OF PROPOSED SUBDIVISION ASSOCIATED WITH WARNER INDUSTRIAL PARK IN PRECINCT 14, HUE HUE ROAD & SPARKS ROAD, WARNERVALE.
CONCEPT PLAN
SCALE 1 : 3000
LEGEND
19426
EA01
F

FIGURE 2

SECTION 2

VEGETATION MANAGEMENT STRATEGY

2.1 DETAILS ON PROTECTIVE MEASURES AND MANAGEMENT STRATEGIES

The vegetation within the development area consists of the following vegetation communities as mapped and described by Bell and Murray (2007):

MU 20aXr	- Alluvial Floodplain Shrub Swamp Forest (Canopy Only);
MU 20f	- Alluvial Floodplain Shrub Swamp Forest (sedge scrub variant);
MU 20Xs	- Alluvial Floodplain Shrub Swamp Forest (regrowth);
MU 28	- Narrabeen Buttonderry Footslopes Forest;
MU 28Xr	- Narrabeen Buttonderry Footslopes Forest (Canopy Only);
MU 28Xs	- Narrabeen Buttonderry Footslopes Forest (Regrowth);
MU 30	- Narrabeen Dooralong Spotted Gum / Ironbark Forest;
MU 30Xr	- Narrabeen Dooralong Spotted Gum / Ironbark Forest (Regrowth);
MU 43a	- Alluvial Riparian Blackbutt Forest (Type Variant);
MU 43aXr	- Alluvial Riparian Blackbutt Forest (Canopy Only);
Xr	- Unspecified Canopy Only.

The management of vegetation removal procedures and the adequate protection of retained vegetation and habitats within the subject site will result in the preservation of quality habitat available and aid in the protection of the current values of bushland within the local area.

Protective measures and Management Strategies recommended within the site are:

- The proposed works will comply with the guidelines from the Department of Water and Energy (DWE) regarding Riparian Corridors, Watercourse Crossings and Instream Works. The proposed Buttonderry Creek Riparian Zone will encompass the required 20 metre wide Core Riparian Zone (CRZ) as described in the current guidelines (DWE, 2008). The riparian zone will also include Vegetated Buffers on both sides of the CRZ and will exceed the requirements of DWE;
- Establishment of a Vegetation Protection Zone (VPZ) around any retained vegetation prior to any clearing or construction works: This VPZ can generally be provided by preserving an area around a tree with a radius of at least 1.25 x the average canopy radius from the trunk (of typical tree forms) or 0.5 x the tree height (*British Standard BS 5837* (1991));
- Appropriate VPZs incorporating fencing and signage surrounding any retained vegetation should be constructed;
- Vegetation protection zones typically represent the area within the dripline (area under canopy) of a tree or bushland;
- All Vegetation Protection Zones should be adequately marked and sign posted prior to the commencement of vegetation removal;
- Impacts of the development upon the Buttonderry Creek and Porters Creek Wetlands will be minimised through the installation of drainage / stormwater control structures and treated water piped downstream.
- All trees not nominated for retention are to be removed prior to any construction activity or bulk earthworks. Approved tree removal operations in the vicinity of retained trees or bushland are to be undertaken in a manner that avoids canopy damage and soil compaction. Such works are to be supervised by the Project Ecologist;

- All trench footings and major earth movement should avoid VPZs;
- Avoid stockpiling materials and soils within VPZs;.
- Machinery is to avoid VPZs during all operations;
- Any trenching or construction works undertaken within VPZs should be witnessed, supervised and recorded (photographed + documented) by the Project Ecologist;
- Leaves, branches and trunks will be wood-chipped or mulched (and spread across site);
- Maintenance of a bushfire Asset Protection Zone (APZ) to protect the proposed industrial development from fires emanating from within the retained bushland and also to protect the bushland from fires which may emanate from the industrial development. This APZ is to be established and maintained according to requirements set down in the Bushfire Assessment for the site (Conacher Environmental Group, 2008) and also according to Planning for Bushfire Protection (Planning NSW 2001);
- Continued monitoring and maintenance of the Vegetation Protection Zone (VPZ) (and any permanent fencing) around any retained native bushland;
- Maintenance of the existing hydrological features and sediment / erosion control measures within the whole of the site during and after the construction of the proposed development.

2.1.1 Current condition of Vegetation

The proposed development footprint has been determined by taking into account the condition of the remaining vegetation within the site.

As can be seen from section 2.1, and Figure 8 From Bell and Murray (2007) a large proportion of the vegetation to be removed has medium to high levels of disturbance. These disturbances have been derived from the long-term uses of the land by agricultural pursuits such as grazing, clearing, timber-getting, underscrubbing, slashing, mowing, weed invasion, trampling by livestock and burning. This has resulted in large portions of the vegetation proposed for removal having only partial upper canopy remaining or the vegetation is in various stages of regrowth.

2.1.2 Identified Management Issues

A summary of the management issues for the proposed development area are presented in Table 2.1.

TABLE 2.1
DEVELOPMENT AREA MANAGEMENT ISSUES, ACTIONS AND METHODS

Issue / Problem	Action	Method	Responsibility
Removal of vegetation for survey purposes	Clearing of vegetation	Brush cutters, scrub-hooks or small machinery (eg Bobcat™).	Surveyors (& Contractor if necessary).
Protection of Native Vegetation within site	Protection of native vegetation outside of the development envelope. Use of Vegetation Protection Zones (VPZs).	Retain bushland in accordance with this document / Installation of protective fencing and signs around bushland VPZ's prior to construction.	Contractor with advice of project ecologist.

TABLE 2.1 (Cont.) DEVELOPMENT AREA MANAGEMENT ISSUES, ACTIONS AND METHODS			
Issue / Problem	**Action**	**Method**	**Responsibility**
Noxious & Environmental Weeds	Undertake targeted weed control.	Hand removal methods, Cut & Paint, Drill & Poison, Scrape & Paint, Spot Spray Herbicides: Roundup &/or Brushoff.	Landowner with advice from project ecologist
Removal of roadway vegetation	Clearing of vegetation	Remove vegetation using a 20-25 tonne excavator. Dismantling of large or hollow bearing trees where necessary.	Developer or contractor
Control of Garden Escapes & Introduced Plants	Targeted weed control	Weed control within whole of the site.	Contractor with advice from project ecologist
Removal of vegetation within Lots	Clearing of vegetation	Remove vegetation using a 20-25 tonne excavator. Dismantling of large or hollow bearing trees where necessary.	Developer or contractor
Erosion and Sediment Control	Installation of erosion control devices, detention ponds	Installation of erosion sediment control devices around building sites. Piping treated water downstream from sensitive wetlands.	Contractor with advice of project manager.
	Maintenance of erosion control devices, detention ponds	Monitor erosion control devices weekly (esp. after heavy rainfall), replace if required.	Contractor with advice of project manager.
Nutrient Load	Re-direction of overland flow to S.W drains, detention ponds; restriction of use of high phosphate and nitrogen chemicals.	Construction of drains, nutrient filters / sinks. Restriction on use of high phosphate and high nitrogen chemicals. Piping treated water downstream from sensitive wetlands.	Contractor with advice of project ecologist.

2.2 DETAILED PROPOSED WEEDING ACTIVITIES TO BE UNDERTAKEN

The primary objectives of these management actions are to control weed invasion within the development area and to prevent weeds from invading the adjoining retained Drainage / Environmental / Open Space Lands subject to a separate Plan of Management (WSC, 2008). This will involve the removal of weed infestations within the proposed development area, allowing the natural regrowth of locally occurring native species (within allowable limits for APZs), and the ongoing maintenance of the whole development area.

Targeted weed control involves selective removal of noxious and environmental weeds. Weed control is prioritised according to species invasiveness and noxious weed category under the *Noxious Weeds Act* (NSW). Targeted weed control is an instantaneous approach requiring 1-3 months to effectively kill weeds.

A two-stage targeted weed control approach is recommended for the subject site. An initial program of targeted weed control will focus on removing highly invasive or noxious weeds, while subsequent weed control will progressively remove other weed species by maintaining regular removal of targeted weed species.

There are currently a number of techniques used for the removal of weeds. These include (Buchanan, 1989):

- the Bradley Method of minimal soil disturbance during weed removal;
- clearing and stabilising techniques;
- the use of herbicides;
- the use of fire;
- biological controls.

Due to the morphological and future industrial characteristics of the site it is recommended that a combination of physical and herbicide removal be implemented within the proposed development area. Weed removal should incorporate four basic philosophies:

- Work from areas containing fewer weeds towards more weed infested areas;

- Minimal disturbance to the soil and surrounding native plants is recommended near areas of retained native vegetation. This is an important aspect especially in this situation as the topography and soils of the Buttonderry creekline make it susceptible to erosion once plant cover has been removed. Soil disturbance is also likely to promote the establishment of annual weeds;

- Allow natural native plant regeneration to occur throughout any retained native plant communities. In some cases it may be necessary to assist regeneration by replanting areas of weed removal with locally occurring native (endemic) species. The weed control, rehabilitation, monitoring and maintenance methods to be utilised within the Creek Riparian Corridor are outlined in a separate plan (WSC, 2008). The plan you are now reading is to be implemented only within the proposed development area of Precinct 14.

Stages of weed removal can be broken into three components:

Primary Weeding
Primary weeding is the initial weeding. It is recommended that primary weeding should be carried out on the subject land to remove the majority of dominant weeds during the construction phase of the development. This involves removal of weeds through herbicide use and hand removal. It is important to note primary weeding usually initiates new growth of both weeds and native species. Primary weeding of the site may take up to three months and it is recommended that this work be carried out by the developer (or their agents) under the direction of a project ecologist.

Secondary or Follow-up Weeding
Secondary or follow-up weeding involves intensive weeding in areas that have already received primary work to remove weed regrowth or overlooked weeds. By this time it is expected that some landscaping has been undertaken and re-colonizing by desired species has begun to occupy the spaces left by the primary weeding phase. It is recommended that secondary weeding be conducted 3-12 months after primary weeding. Secondary weeding should be carried out by the developer (or their agents / landscape contractor).

Maintenance Weeding
After primary and secondary weeding, the area should be able to resist most weeds. However, weeds will re-establish on the site from birds, wind or water transporting seed and other propagules into the site. Maintenance weeding should be undertaken three or four times a year until such time as the occurrence of weeds is very low, then only hand-weeding

may be required as needed. Maintenance weeding of the site may take up to one week and should be carried out by the developer, owner or a landscape contractor / groundskeeper.

Herbicides

The use of herbicides is needed where hand removal of weeds is impractical. The use of Glyphosate based herbicides (e.g. Roundup®) is recommended in accordance with the manufacturers labels. Within 5m of a water body or any stormwater infrastructure only Roundup Bi-active® or equivalent formulations can be used.

There are various categories of herbicides currently used (Buchanan, 1989), specifically those that kill on contact (contact herbicides), and those that must move through the tissue of the plant (systemic herbicides). Other herbicides include those that are non-selective and those that are selective. There are also those herbicides that kill all existing plants and those that prevent germination (Buchanan, 1989). The most commonly used herbicides are Glyphosate 340 ®, Roundup ®, Bi-active and Weed Master ®.

Other regularly used herbicides include Grazon DS ®, Brushoff ®, Brush Killer ® and Starane 200 ®. These non-glyphosate based herbicides are not to be used adjacent to water bodies, therefore their use within the subject site is not recommended as they will have a detrimental effect within the Buttonderry Creek Riparian Corridor.

An advantage of herbicide use is the low time taken to spray weeds as compared to physically removing them, particularly for large infestations of weeds. The disadvantage is that no one herbicide is effective on all weed species, thus the herbicide used needs to achieve an effective kill rate.

Buchanan (1989) recommends that the use of herbicides should be considered when:

- there are small areas of dense weeds with few or no native plants to protect;
- there are large areas of weeds;
- the weeds are growing too rapidly for physical removal; and
- the weeds are located in areas with a high potential for erosion if vegetation is removed.

The potential for destabilising and causing erosion as a result of spraying vegetation needs to be considered prior to commencement of weed control works.

Operators with a Chemcert or equivalent training must undertake the spraying of weeds. The operator must evaluate the success of each treatment after a set period of time according to the labelled effectiveness for each herbicide. Care must be taken when applying herbicides near water bodies due to the sensitivity of flora, fauna and marine life to runoff containing these herbicides.

All herbicides must be applied according to the herbicide label and the provisions of the *Protection of the Environmental Operations Act* (NSW).

Exotic species known in the local area and targeted for removal throughout the duration of the management plan are listed in Table 2.2. General management strategies enabling appropriate removal of these species are provided in Appendix II.

TABLE 2.2 EXOTIC SPECIES TARGETED FOR REMOVAL		
On Site	**Scientific Name**	**Common Name**
#	*Ageratina adenophorum*	Crofton Weed
#	*Cinnamomum camphora*	Camphor Laurel
#	*Cortaderia selloana*	Pampas Grass
#	*Cyperus eragrostis*	Dirty Dora Sedge
#	*Erythrina X Sykesii*	Coral Tree
#	*Lantana camara*	Lantana
#	*Ligustrum lucidum*	Large-leaved Privet
#	*Ochna serrulata*	Mickey-mouse Plant
#	*Phytolacca octandra*	Inkweed
#	*Pinus radiata*	Radiata Pine
#	*Rubus anglocandicans* (was *R. ulmifolius*)	Blackberry
#	*Salix babylonica*	Weeping Willow
3	*Salvinia molesta*	Salvinia
#	*Senna pendula* var. *glabrata*	Senna
# = Species observed on site or in the near locality **3** = Weed of National Significance (required by law to be controlled - in all states)		

The initial stages of weeding are estimated to take approximately 1 – 3 months, while the ongoing maintenance period for the restoration process should continue for at least two years in order to be effective.

Monitoring of the progress of weed removal, plant growth and requirements for weed control should be undertaken on a minimum of a biannual basis for two years, then at 3 years, 5 years and 10 years with progress reports, including photographs, prepared and forwarded to Wyong Shire Council.

2.3 VEGETATION CLEARING DETAILS

Staged Clearing
The clearing of vegetation from the site will be undertaken as a staged procedure as detailed below:

1) *Survey and Development Layout*
It is anticipated that the first stage of clearing will be for survey purposes and will commence immediately upon approval and will be undertaken by surveyors. This survey will involve 'pegging out' the proposed development incorporating lines along building envelopes and roadway reservations.

2) *Roadways and Services*
The second stage of clearing will be for roadways and services. This stage is expected to commence within three months after approval by the Consent Authority.

3) *Lot Clearing*
Clearing of lots prior to industrial development is expected to be undertaken after the location of roads and some services are established.

Amount of Clearing Required
The proposed development is expected to result in vegetation clearing within the proposed industrial zoned areas which total approximately 80 hectares within Precinct 14 which totals approximately 130 hectares. Approximately 48 hectares of good to medium quality native vegetation will be retained within the Public Reserves and the Buttonderry Creek Riparian

Corridor. These areas of vegetation to be retained within Precinct 14 are not subject to this Vegetation Management Plan as they will have their own management plan (WSC, 2008).

Habitat Tree Clearing Procedure
It is expected that any hollow bearing tree to be removed is to be dismantled by arborists in the presence of a suitably qualified and licensed fauna consultant. Fauna that is utilising the hollows will be relocated to other nearby suitable habitat.

Equipment to be Utilised
The largest trees may need clearing by an arborist utilizing chainsaws and tree climbing equipment or cherry picker equipment (if deemed appropriate). The remainder of the vegetation will be cleared using a 20-25 tonne excavator to push trees over and to stockpile cleared vegetation (avoiding Tree Protection Zones – Section 2.3).

Branches and trunks will be wood-chipped or mulched while the stumps will be disposed of or recycled at the local waste disposal area. Stock-piled mulch material will be retained for use in future landscaping.

Inspections
Inspections of the site by the Project Ecologist or Arborist will be undertaken prior to and during the clearing operations to ensure that trees and bushland marked for retention are adequately marked and that other appropriate clearing and protection procedures are being maintained.

2.4 DETAILS OF ONGOING MONITORING AND MAINTENANCE ACTIVITIES

It is recommended that regular monitoring inspections be undertaken on a minimum of twice a year for two years after construction of the industrial area, then at 3 years, 5 years and 10 years post construction. This will allow the determination of the health of the vegetation and may include identification of any areas suffering from disturbance or in need of further landscape or curtilage planting, weed control, sediment or storm water control, bank and soil stabilisation or maintenance of adjoining rehabilitated or regenerating areas.

2.5 RECOMMENDED ECOLOGICAL FIRE REGIME

Given the size, structure of the vegetation within the development area and within the adjoining bushland reserves and riparian corridor, and location of the subject site which will become an industrial area, an ecological burning regime is not recommended for this site. Small burn piles may be permitted subject to the appropriate application and permit processes.

2.6 DRAINAGE AND SOIL EROSION ISSUES

At present the subject site consists of a vegetated but disturbed parcel of land situated on lower slopes which are bisected by a wide vegetated drainage line. The site has been disturbed by the past clearing and agricultural (grazing) activities followed by moderate to high levels of weed invasion. The subject site consists of gentle slopes with a sandy loam soil and dark fine-grained alluvial soils. The development area is bisected by a wide drainage line with predominantly native vegetation to be retained within a riparian corridor.

The objective of stormwater management is to ensure drainage across the site does not have a negative impact on retained bushland, developed areas and surrounding waterways or retained and managed riparian vegetation.

Erosion and sediment control measures are to be implemented within the subject site and especially around the proposed residential subdivision to minimise adverse effects as a result of expected increased erosion and sediment loading. These include:

- The safe disposal of all waste products;
- Coordinated work practices aimed at minimising land disturbance;
- The disposal of 'clean' water off site;
- The minimisation of groundcover disturbance in areas of retained bushland and near small groups or individual trees through the establishment of Vegetation Protection Zones (VPZs);
- Routine site inspections of drains, channels, sediment control structures and water quality;
- Identification, rehabilitation and revegetation of eroded or potential erosion areas;
- Installation and maintenance of flow control structures and soil stabilising vegetation, biodegradable matting or directly seeded areas wherever required.

The minimisation of soil erosion will be achieved through soil stabilisation measures, sediment fencing and water control techniques. Soil stabilisation measures that may be implemented include, immediate revegetation of cleared surfaces via direct seeding, planting of locally occurring native (endemic) species, mulching and the installation of biodegradable blankets if required. It is expected that a soil and erosion mitigation plan outlining all soil stabilisation, erosion controls and sediment control works will be undertaken according to government department and Wyong Shire Council's guidelines.

2.7 SITE MANAGEMENT DURING CONSTRUCTION

Inspections of the site by the Environmental Consultant should be undertaken prior to and during the construction operations to ensure that vegetated areas designated for retention and Vegetation Protection Zones (VPZs) around retained bushland are adequately marked, signposted and that other appropriate protection procedures are being maintained.

Construction and landscape works are likely to alter the environment and soil properties surrounding the retained vegetation adjacent to the construction site. Therefore, the following management strategies are proposed to minimise damage to native vegetation during the construction period.

Vegetation Protection Zones (VPZs)
The compaction of soil surrounding retained vegetation is detrimental to root growth by reducing water infiltration and soil oxygenation rates. A Vegetation Protection Zone (VPZ) will be established outside of the construction zone in accordance with the tree / vegetation protection guidelines (Section 2.8) using appropriate signage, star pickets and wire, or suitable high visibility marking tape / orange plastic net fencing, or temporary chain-link fencing panels. This will reduce the effects of soil compaction by prohibiting vehicle access and the stockpiling of construction material such as topsoil, road base, mulch and woodchips within the areas containing retained vegetation.

Erosion and Sediment Control
Erosion and sediment control measures are to be implemented to minimise adverse effects due to increased erosion and sediment loading. These include a number of strategies that are outlined in Section 2.6. It is expected that silt fencing will be utilised according to government department and Wyong Shire Council guidelines and regulations. It is also expected that a qualified consultant will produce and enact a soil and erosion control plan prior to commencement of the construction phase of the development.

The minimisation of soil erosion will be achieved through soil stabilisation measures and water control techniques. Suitable soil stabilisation measures to be implemented include the

immediate revegetation of cleared surfaces via seeding, planting of native species, mulching and the installation of biodegradable blankets or sprayed binding materials. Suitable water control measures include construction of temporary or permanent earth banks, catch drains, detention and sediment ponds (including Gross Pollutant Traps), grassed and armoured waterways, rock earth and sand bag dams and outlet protection systems to prevent scouring.

Mulching
Leaves, branches and trunks of felled native vegetation will be wood-chipped or mulched (and re-used across the site). Mulching is an efficient method to impede the establishment of weed species, soil erosion, compaction and desiccation. Mulching should not be used where the weed *Hydrocotyle bonariensis* (Pennywort) is present as it increases its rate of spread. Woodchip or other suitable mulch may be placed at a depth of 75-100mm covering any areas of tree replanting or landscape areas. Areas surrounding the stems/trunks of plants are to be kept free from mulch, thereby reducing the incidence of collar rot on retained or planted flora.

2.8 TREE / VEGETATION PROTECTION GUIDELINES

The following guidelines are proposed in relation to the protection of retained trees or bushland situated outside of the construction zone:

i. It is expected that the proposed works will comply with the new guidelines from the Department of Water and Energy (DWE) regarding Riparian Corridors, Watercourse Crossings and Instream Works. The proposed Buttonderry Creek Riparian Zone will encompass the required 20 metre wide Core Riparian Zone (CRZ) as described in the current guidelines (DWE 2008). The riparian zone will also include Vegetated Buffers on both sides of the CRZ and will exceed the requirements of DWE.
ii. Establishment of a Vegetation Protection Zone (VPZ) around any retained vegetation prior to any clearing of vegetation or construction works: This VPZ can generally be provided by preserving an area around a tree with a radius of at least 1.25 x the average canopy radius from the trunk (of typical tree forms) or 0.5 x the tree height (*British Standard BS 5837* (1991)).
iii. Prior to construction, the retained vegetation (VPZs) should be adequately marked and sign posted using suitable signage, star pickets and wire, or high visibility tape / plastic net fencing, or temporary chain-link fencing panels.
iv. All trees not nominated for retention are to be removed prior to any construction activity or bulk earthworks. Approved tree removal operations in the vicinity of retained trees or bushland are to be undertaken in a manner that avoids canopy damage and soil compaction. Such works are to be supervised by the Project Ecologist.
v. Post-construction fencing around retained vegetation (VPZs) should be of a suitable type (permanent chain-link fence, pressed metal or post and wire) and shall provide access for maintenance of retained and managed bushland within the adjoining VPZs such as the Public Reserves and Buttonderry Creek Riparian Corridor.
vi. All trenches (e.g. for services such as electricity, telephone, sewage, water and footings) and any major earth movement should avoid the VPZs.
vii. Any trenching or construction works undertaken within VPZs should be witnessed, supervised and recorded (photographed + documented) by the Project Ecologist.
viii. Stockpiling materials and soils within VPZs is to be avoided.
ix. Machinery is to avoid vegetation protection zones (VPZs) during all operations.
x. Continued monitoring and maintenance of the Vegetation Protection Zone (VPZ) (and any permanent fencing) around any retained native bushland.

xi. Maintenance of the existing hydrological features and sediment / erosion control measures within the whole of the site during and after the construction of the proposed development are to be undertaken on a regular basis as outlined in the Sediment / Erosion Control Plan.

SECTION 3

PROPOSED WORKS PROGRAM

3.1 PROPOSED WORKS PROGRAM

A proposed works program is outlined in Table 3.1.

TABLE 3.1
PROPOSED WORKS PROGRAM

Action	Responsibility
Pre-construction	
• Location of Retained Bushland areas and identification (flagging) of Tree / Vegetation Protection Zones (VPZs).	Project Ecologist
• Erection of erosion control fencing.	Contractor with advice of Project Manager
• Installation of protective fencing and signs around Vegetation Protection Zones (VPZs).	Contractor with advice of Project Ecologist
• Identification of potential Habitat Trees.	Project Ecologist
• Commencement of Bushland Regeneration and noxious weed control within Vegetation Protection Zones (VPZs).	Contractor / suitably qualified Bushland Regenerator
• Maintenance of the bushfire Asset Protection Zones (APZs) as per requirements.	Contractor / suitably qualified Bushland Regenerator / Landholder
• Preparation of a landscape/tree planting program (if required).	Contractor / Project Ecologist
Construction	
• Monitor erosion control fencing (weekly – esp. after rain) and replace if required.	Contractor with advice of Project Manager
• Monitor VPZ protection fencing and signs and replace if required.	Contractor with advice of Project Ecologist
• Continuation of weed control and facilitation of bushland regeneration within Vegetation Protection Zones (VPZs)	Contractor / suitably qualified Bushland Regenerator
• Maintenance of the bushfire Asset Protection Zones (APZs) as per requirements.	Contractor / suitably qualified Bushland Regenerator / Landholder
Post-construction	
• Remove tree protection fencing and signs within or around construction areas (where required).	Contractor with advice of Project Manager
• Continuation of weed control and facilitation of bushland regeneration and within Vegetation Protection Zones (VPZs).	Contractor / suitably qualified Bushland Regenerator
• Maintenance of the bushfire Asset Protection Zones (APZs) as per requirements.	Contractor / suitably qualified Bushland Regenerator / Landholder
• Monitoring of retained bushland within Vegetation Protection Zones (VPZs) at 6, 12, 18, 24 months; then 3yrs, 5yrs and 10yrs post construction. – conduct maintenance if required.	Project Ecologist
• Reporting to Council at the end of each monitoring period (annually).	Project Ecologist

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APPENDIX I

FLORA CHARACTERISTICS OF THE SITE

Extracted from: - Bell and Murray, (2007)
Ecological Investigations (Version 2)
Wyong Employment Zone,
Warnervale Business Park, Warnervale Airport Lands,
Precincts 11 & 13 and Precinct 14

1. INTRODUCTION

A Flora and Fauna Report was completed by Bell and Murray (May 2007) to determine the flora and fauna species of the entire Wyong Employment Zone and to provide an assessment in relation to threatened species in accordance with the *Threatened Species Conservation Act (1995)* and the *Environmental Protection and Biodiversity Conservation Act (1999)*. Four threatened flora species (*Angophora inopina, Grevillea parviflora, Melaleuca biconvexa* and *Tetratheca juncea*) as listed in the *Threatened Species Conservation Act* (1995) and the *Environmental Protection and Biodiversity Conservation Act* (1999) were observed within Precinct 14.

Three Endangered Ecological Communities (EECs) were observed on-site. These EECs were Freshwater Wetlands on Coastal Floodplains (FWCF), Swamp Sclerophyll Forest on Coastal Floodplains (SSFCF) and River Flat Eucalypt Forest on Coastal Floodplains (RFEFCF).

It was determined that the proposed development would have no significant impact with regards to the TSC Act (1995) and that a species impact statement would not be required.

1.1 VEGETATION DESCRIPTION

According to Bell and Murray (2007) the vegetation communities present within Precinct 14 consist of the following Map Units:

MU 20aXr	- Alluvial Floodplain Shrub Swamp Forest (Canopy Only);
MU 20f	- Alluvial Floodplain Shrub Swamp Forest (sedge scrub variant);
MU 20Xs	- Alluvial Floodplain Shrub Swamp Forest (regrowth);
MU 28	- Narrabeen Buttonderry Footslopes Forest;
MU 28Xr	- Narrabeen Buttonderry Footslopes Forest (Canopy Only);
MU 28Xs	- Narrabeen Buttonderry Footslopes Forest (Regrowth);
MU 30	- Narrabeen Dooralong Spotted Gum / Ironbark Forest;
MU 30Xr	- Narrabeen Dooralong Spotted Gum / Ironbark Forest (Regrowth);
MU 43a	- Alluvial Riparian Blackbutt Forest (Type Variant);
MU 43aXr	- Alluvial Riparian Blackbutt Forest (Canopy Only);
Xr	- Unspecified Canopy Only.

Vegetation community descriptions are provided below while a detailed species list is provided in Table 2.3.

MU 20: Alluvial Floodplain Shrub Swamp Forest (MU20 in Bell and Murray, 2007)
This vegetation community was sporadically recorded in southern and south-eastern parts of the subject site. The Alluvial Floodplain Shrub Swamp Forest, as described in Bell and Murray (2007), is highly variable depending on depth to water table, soil type and other factors. Dominant species commonly associated with this vegetation community type include *Eucalyptus amplifolia* subsp. *amplifolia, Eucalyptus robusta*, *Angophora floribunda, Melaleuca linariifolia* and *Melaleuca decora*. The understorey is often characterised by a dense layer of sedges and grasses, and a scattered shrub layer of *Leptospermum juniperinum, Gahnia clarkei*, and juvenile *Melaleuca linariifolia* and *Eucalyptus* species. Two threatened species (*Melaleuca biconvexa* and *Angophora inopina*) were recorded within this vegetation community on the subject site. Alluvial Floodplain Shrub Swamp Forest can be considered as part of the Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South-East Corner bioregions Endangered Ecological Community (SSFCF). Within the regional classification of NPWS (2000), this community falls into either the Swamp Mahogany – Paperbark Swamp Forest (MU37) or the Wyong Paperbark Swamp Forest (MU43).

MU 28: Narrabeen Buttonderry Footslopes Forest (MU28 in Bell and Murray, 2007)
Narrabeen Buttonderry Footslopes Forest was recoded mostly in the north-eastern parts of the subject site. Dominant canopy species and regrowth was recorded in the south-western corners of the site. Dominant species characteristic of this vegetation community type include *Angophora costata, Syncarpia glomulifera* subsp. *glomulifera, Eucalyptus umbra, Melaleuca decora, Eucalyptus fibrosa, Banksia spinulosa, Melaleuca nodosa, Bossiaea obcordata, Epacris pulchella, Leptospermum trinervium, Goodenia heterophylla and Lomandra oblique.* Two threatened species (*Angophora inopina* and *Tetratheca juncea*) were recorded within this vegetation community on the subject site.

MU 30: Narrabeen Dooralong Spotted Gum – Ironbark Forest (MU30 in Bell and Murray, 2007)
Narrabeen Dooralong Spotted Gum – Ironbark Forest was recorded in the north-east of the subject site, and towards the centre of the subject site in a patchy distribution, for example along fenceline corridors. In some areas, sections of MU30 have been partially cleared for grazing purposes, and support a disturbed forest of variable density and canopy retention. This was evident in the north-eastern corner and centre of Precinct 14 north-west of the F3 Freeway. Dominant species commonly associated with this vegetation community type include *Corymbia maculata*, *Eucalyptus fibrosa*, *Daviesia ulicifolia* and *Podolobium ilicifolium.* Two threatened species *(Grevillea parviflora* subsp. *parviflora* and *Melaleuca biconvexa*) were recorded within this vegetation community type on the subject site.

Regionally, this vegetation type is equivalent to Coastal Foothills Spotted Gum – Ironbark Forest (MU15) in NPWS (2003).

MU 43a: Alluvial Riparian Blackbutt Forest (MU43a in Bell and Murray, 2007)
Much of Buttonderry Creek supports Alluvial Riparian Blackbutt Forest as it flows through the study area. This vegetation community was only found in association with the creekline. Alluvial Riparian Blackbutt Forest equates to the Alluvial Tall Moist Forest of NPWS (2000). Dominant species commonly associated with this vegetation community type include *Eucalyptus pilularis, Corymbia maculata* and *Gahnia clarkei.* Two threatened species (*Tetratheca juncae* and *Melaleuca biconvexa*) were found within this vegetation community type on the subject site. Alluvial Riparian Blackbutt Forest was also found to contain two Endangered Ecological Communities; River Flat Eucalypt Forest and remnants of Freshwater Wetlands on Coastal Fllodplains.

MU Xr: Canopy-only vegetation (includes, for example, units such as "30Xr") (MUXr in Bell and Murray, 2007)
Several locations within the study area support vegetation where understorey structure has been completely or partially removed or modified, such that only emergent canopy trees remain. In such cases, these areas have been mapped with the MU 'Xr' appended to the main vegetation map unit. For example, MU 28Xr refers to canopy-only vegetation of MU28. In areas where it has been difficult to assign remnant trees to a particular vegetation community, the tag "Xr" only has been applied, representing unspecified canopy-only vegetation.

MU Xs: Regrowth vegetation (MU Xs in Bell and Murray, 2007)
One area within the subject site was recorded to support regrowth vegetation that does not align well with any specific vegetation type. In such cases, these areas have been mapped with the MU 'Xs" to indicate opportunist regrowth. In certain areas, the floristic composition present in regrowth areas allows alignment with the established vegetation communities, and these are included within the general mapping for those communities, but with the suffix 'Xs". For example, MU 28Xs refers to regrowth vegetation of MU28.

2. FLORA SPECIES PRESENT, WYONG EMPLOYMENT ZONE

All species recorded within the whole of the Wyong Employment Zone by Eastcoast Flora Survey and Sinclair Knight Mertz during plot sampling, targeted seasonal and miscellaneous surveys have been included in Table 2.1. Nomenclature follows the National Herbarium of New South Wales.

Precinct 14 may not contain all of the flora species listed within Table 2.1. This species list is for the whole of the Wyong Employment Zone (WEZ) and data which differentiates the location of each species within the WEZ was unavailable.

Threatened species that do not occur within Precinct 14 (Bell and Murray, 2007), have been omitted from this flora list to avoid confusion or misunderstandings regarding the presence or absence of other threatened flora known to occur within the greater area of the Wyong Employment Zone.

TABLE 2.1
FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE
(Extracted from Bell and Murray 2007)

Family	Scientific Name	Common Name
TREES		
Arecaceae	*Livistona australis*	Cabbage Tree Palm
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak
Casuarinaceae	*Casuarina glauca*	Swamp Oak
Euphorbiaceae	*Glochidion ferdinandii*	Cheese Tree
Fabaceae	*Erythrina sykesii**	Coral Tree
Lauraceae	*Cinnamomum camphora**	Camphor Laurel
Mimosaceae	*Acacia irrorata* subsp. *irrorata*	Green Wattle
Mimosaceae	*Acacia terminalis* subsp. *longiaxialis*	Sunshine Wattle
Myrsinaceae	*Myrsine variabilis*	Muttonwood
Myrtaceae	*Acmena smithii*	Lillypilly
Myrtaceae	*Angophora costata*	Smooth-barked Apple
Myrtaceae	*Angophora floribunda*	Rough-barked Apple
Myrtaceae	*Angophora inopina*[TS]	-
Myrtaceae	*Backhousia myrtifolia*	Grey Myrtle
Myrtaceae	*Corymbia gummifera*	Red Bloodwood
Myrtaceae	*Corymbia maculata*	Spotted Gum
Myrtaceae	*Eucalyptus agglomerata*	Blue-leaved Stringybark
Myrtaceae	*Eucalyptus amplifolia*	Cabbage Gum
Myrtaceae	*Eucalyptus capitellata*	Brown Stringybark
Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark
Myrtaceae	*Eucalyptus fibrosa*	Broad Leaved Ironbark
Myrtaceae	*Eucalyptus globoidea*	White Stringybark
Myrtaceae	*Eucalyptus haemastoma*	Scribbly Gum
Myrtaceae	*Eucalyptus longifolia*	Woollybutt
Myrtaceae	*Eucalyptus paniculata* subsp. *paniculata*	Grey Ironbark
Myrtaceae	*Eucalyptus pilularis*	Blackbutt
Myrtaceae	*Eucalyptus punctata*	Grey Gum
Myrtaceae	*Eucalyptus racemosa*	Narrow-leaved Scribbly Gum
Myrtaceae	*Eucalyptus racemosa X piperita?*	-
Myrtaceae	*Eucalyptus resinifera* subsp. *resinifera*	Red Mahogany
Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany
Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum
Myrtaceae	*Eucalyptus siderophloia*	Northern Grey Ironbark
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum
Myrtaceae	*Eucalyptus umbra* subsp. *umbra*	Broad-leaved White Mahogany
Myrtaceae	*Melaleuca biconvexa*[TS]	-
Myrtaceae	*Melaleuca decora*	-

TABLE 2.1 (Cont.) FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE (Extracted from Bell and Murray 2007)		
Myrtaceae	*Melaleuca linariifolia*	Snow in Summer
Myrtaceae	*Melaleuca stypheloides*	Prickly-leaved Tea Tree
Myrtaceae	*Syncarpia glomulifera*	Turpentine
Myrtaceae	*Syzygium oleosum*	Blue lillypilly
Oleaceae	*Notelaea longifolia* forma *intermedia*	Mock Olive
Oleaceae	*Notelaea longifolia* forma *longifolia*	Mock Olive
Pinaceae	*Pinus radiata**	Radiata or Monterey Pine
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Proteaceae	*Banksia serrata*	Old Man Banksia
Rhamnaceae	*Alphitonia excelsa*	Red Ash
Rutaceae	*Citrus limon**	Lemon Tree
Salicaceae	*Salix babylonica**	Weeping Willow
Santalaceae	*Exocarpos cupressiformis*	Native Cherry
SHRUBS		
Apiaceae	*Platysace ericoides*	Heathy Platysace
Apiaceae	*Platysace lanceolata*	Lance-leaf Platysace
Araliaceae	*Polyscias sambucifolia*	Elderberry Panax
Asteraceae	*Cassinia aculeata*	Dolly Bush
Asteraceae	*Cassinia arcuata*	Sifton Bush
Cannabiaceae	*Cannabis sativa**	Cannabis
Cesalpinioideae	*Senna pendula* var. *glabrata**	-
Dilleniaceae	*Hibbertia vestita*	-
Epacridaceae	*Epacris microphylla*	Coral Heath
Epacridaceae	*Epacris pulchella*	NSW Coral Heath
Epacridaceae	*Leucopogon juniperinus*	Prickly Beard-heath
Epacridaceae	*Melichrus urceolatus*	-
Epacridaceae	*Monotoca scoparia*	Prickly Broom-heath
Euphorbiaceae	*Amperea xiphoclada*	Broom Spurge
Euphorbiaceae	*Breynia oblongifolia*	Coffee Bush
Fabaceae	*Bossiaea obcordata*	Spiny Bossiaea
Fabaceae	*Bossiaea prostrata*	-
Fabaceae	*Bossiaea rhombifolia*	-
Fabaceae	*Daviesia squarrosa*	-
Fabaceae	*Daviesia ulicifolia*	Gorse Bitter Pea
Fabaceae	*Dillwynia retorta* var. *retorta*	Eggs and Bacon
Fabaceae	*Gompholobium latifolium*	Broad-leaf Wedge-pea
Fabaceae	*Gompholobium pinnatum*	-
Fabaceae	*Hovea linearis*	-
Fabaceae	*Mirbelia rubiifolia*	-
Fabaceae	*Platylobium formosum* subsp. *parviflorum*	Handsome Flat-pea

TABLE 2.1 (Cont.)
FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE
(Extracted from Bell and Murray 2007)

Fabaceae	*Podolobium scandens*	Netted Shaggy Pea
Fabaceae	*Pultenaea ferruginea*	-
Fabaceae	*Pultenaea retusa*	-
Fabaceae	*Pultenaea tuberculata*	-
Fabaceae	*Pultenaea villosa*	-
Fabaceae	*Sphaerolobium minus*	-
Fabaceae	*Sphaerolobium vimineum*	-
Faboideae	*Pultenaea paleacea* var. *paleacea*	-
Lamiaceae	*Clerodendrum tomentosum*	Hairy Clerodendrum
Loganiaceae	*Logania pusilla*	-
Mimosaceae	*Acacia falcata*	Sickle Wattle
Mimosaceae	*Acacia longifolia* var. *longifolia*	Sydney Golden Wattle
Mimosaceae	*Acacia longifolia* var. *sophorae*	-
Mimosaceae	*Acacia myrtifolia*	Red Stem Wattle
Mimosaceae	*Acacia suaveolens*	Sweet Scented Wattle
Mimosaceae	*Acacia ulicifolia*	Prickly Moses
Myrtaceae	*Callistemon citrinus*	Crimson Bottlebrush
Myrtaceae	*Callistemon linearis*	Narrow-leaved Bottlebrush
Myrtaceae	*Callistemon rigidus*	Stiff Bottlebrush
Myrtaceae	*Callistemon salignus*	Willow Bottlebrush
Myrtaceae	*Kunzea ambigua*	Tick Bush
Myrtaceae	*Leptospermum juniperinum*	Prickly Tea-tree
Myrtaceae	*Leptospermum polygalifolium* subsp. *cismontanum*	Lemon Scented Tea-tree
Myrtaceae	*Leptospermum polygalifolium* subsp. *montanum?*	Lemon Scented Tea-tree
Myrtaceae	*Leptospermum polygalifolium* subsp*. polygalifolium*	Lemon Scented Tea-tree
Myrtaceae	*Leptospermum trinervium*	Flaky-barked Tea-tree
Myrtaceae	*Melaleuca ericifolia*	Swamp Paperbark
Myrtaceae	*Melaleuca nodosa*	Ball Honey Myrtle
Myrtaceae	*Melaleuca sieberi*	-
Myrtaceae	*Melaleuca thymifolia*	Thyme Honey Myrtle
Ochnaceae	*Ochna serrulata**	Mickey Mouse Plant
Oleaceae	*Ligustrum lucidum**	Large-leaved Privet
Phytolaccaceae	*Phytolacca octandra**	Inkweed
Pittosporaceae	*Bursaria spinosa* var. *spinosa*	Blackthorn
Pittosporaceae	*Pittosporum revolutum*	Yellow Pittosporum
Polygalaceae	*Comesperma ericinum*	Matchheads
Proteaceae	*Banksia oblongifolia*	-
Proteaceae	*Banksia spinulosa* var*. collina*	Hairpin Banksia
Proteaceae	*Grevillea humilis* subsp. *humilis*	-
Proteaceae	*Grevillea parviflora* subsp. *parviflora*^{TS}	-

TABLE 2.1 (Cont.)
FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE
(Extracted from Bell and Murray 2007)

Proteaceae	*Grevillea sericea*	Pink Spider Flower
Proteaceae	*Hakea laevipes* subsp. *laevipes*	-
Proteaceae	*Hakea salicifolia*	Willow Hakea
Proteaceae	*Hakea teretifolia*	Dagger Hakea
Proteaceae	*Isopogon anemonifolius*	Flat-leaved Drumsticks
Proteaceae	*Lambertia formosa*	Mountain Devil
Proteaceae	*Persoonia laurina*	Laurel Geebung
Proteaceae	*Persoonia levis*	Broad-leaved Geebung
Proteaceae	*Persoonia linearis*	Narrow-leaved Geebung
Rosaceae	*Rubus anglocandicans**	Blackberry
Rubiaceae	*Opercularia diphylla*	-
Rutaceae	*Boronia parviflora*	Swamp Boronia
Rutaceae	*Boronia polygalifolia*	Milkwort Boronia
Rutaceae	*Zieria smithii*	Sandfly Zieria
Solanaceae	*Solanum mauritianum**	Wild Tobacco
Verbenaceae	*Lantana camara**	Lantana
Zamiaceae	*Macrozamia flexuosa*	-
GROUNDCOVERS		
Acanthaceae	*Brunoniella australis*	Blue Trumpet
Acanthaceae	*Brunoniella pumilio*	Dwarf Blue Trumpet
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower
Adiantaceae	*Adiantum aethiopicum*	Common Maidenhair
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed
Anthericaceae	*Arthropodium minus*	Small Vanilla Lily
Anthericaceae	*Caesia parviflora* var. *parviflora*	Pale Grass Lily
Anthericaceae	*Caesia parviflora* var. *vittata*	-
Anthericaceae	*Laxmannia gracilis*	Slender Wire Lily
Anthericaceae	*Thysanotus juncifolius*	Fringed Lily
Anthericaceae	*Thysanotus tuberosus*	Fringed Lily
Anthericaceae	*Tricoryne elatior*	Yellow Rush Lily
Anthericaceae	*Tricoryne simplex*	Yellow Rush-lily
Apiaceae	*Centella asiatica*	Swamp Pennywort
Apiaceae	*Centella cordifolia*	
Apiaceae	*Hydrocotyle peduncularis*	Pennywort
Apiaceae	*Hydrocotyle tripartita*	Pennywort
Apiaceae	*Trachymene incisa* subsp. *incisa*	Native Parsnip
Aspleniaceae	*Asplenium flabellifolium*	Necklace Fern
Asteraceae	*Ageratina adenophorum**	Crofton Weed
Asteraceae	*Aster subulatus**	Wild Aster
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Asteraceae	*Brachyscome angustifolia* var. *angustifolia*	-

TABLE 2.1 (Cont.) FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE (Extracted from Bell and Murray 2007)		
Asteraceae	*Conyza bonariensis**	Flax-leaf Fleabane
Asteraceae	*Conyza sp**	Fleabane
Asteraceae	*Eclipta platyglossa*	-
Asteraceae	*Euchiton sphaericus*	Cudweed
Asteraceae	*Gamochaeta spicata**	Cudweed
Asteraceae	*Hypochaeris microcephala* var. *albiflora**	-
Asteraceae	*Hypochaeris radicata**	Flatweed
Asteraceae	*Lagenifera gracilis?*	-
Asteraceae	*Lagenifera stipitata*	-
Asteraceae	*Senecio linearifolius*	Fireweed
Asteraceae	*Senecio madagascariensis**	Fireweed
Asteraceae	*Soliva sessilis**	Jojo
Asteraceae	*Sonchus asper**	Sow-thistle
Asteraceae	*Sonchus oleraceus**	Common Sow-thistle
Asteraceae	*Taraxacum officinale**	Dandelion
Asteraceae	*Vernonia cinerea* var. *cinerea*	-
Blandfordiaceae	*Blandfordia grandiflora*	Christmas Bell
Blechnaceae	*Blechnum cartilagineum*	Gristle Fern
Blechnaceae	*Doodia aspera*	Rasp Fern
Campanulaceae	*Wahlenbergia gracilis*	Australian Bluebell
Carophyllaceae	*Cerastium glomeratum**	Mouse-ear Chickweed
Clusiaceae	*Hypericum gramineum*	Small St Johns Wort
Colchicaceae	*Burchardia umbellata*	Milkmaids
Colcicaceae	*Wurmbea dioica* subsp. *dioica*	Early Nancy
Commelinaceae	*Commelina cyanea*	Scurvy Weed
Convolvulaceae	*Cuscuta australis*	Australian Dodder
Convolvulaceae	*Dichondra repens*	Kidney Weed
Cyperaceae	*Carex appressa*	Tall Sedge
Cyperaceae	*Carex inversa*	Knob Sedge
Cyperaceae	*Carex longebrachiata*	Bergalia Tussock
Cyperaceae	*Carex polyantha*	-
Cyperaceae	*Caustis recurvata* var. *recurvata*	-
Cyperaceae	*Cyathochaeta diandra*	-
Cyperaceae	*Cyperus eragrostis**	Umbrella Sedge
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-rush
Cyperaceae	*Gahnia aspera*	Saw Sedge
Cyperaceae	*Gahnia clarkei*	Tall Saw-sedge
Cyperaceae	*Gahnia radula*	-
Cyperaceae	*Gahnia sieberiana*	Red-fruited Saw-sedge
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge
Cyperaceae	*Lepidosperma quadrangulatum*	-
Cyperaceae	*Ptilothrix deusta*	-

TABLE 2.1 (Cont.)
FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE
(Extracted from Bell and Murray 2007)

Cyperaceae	*Schoenus brevifolius*	Bog-rush
Cyperaceae	*Schoenus melanostachys*	Black Bog Rush
Cyperaceae	*Tetraria capillaris*	-
Cyperaceae	*Tricostularia pauciflora*	-
Dennstaedtiaceae	*Histiopteris incisa*	Bat's Wing Fern
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Dicksoniaceae	*Calochlaena dubia*	False Bracken
Dilleniaceae	*Hibbertia aspera*	Rough Guinea Flower
Dilleniaceae	*Hibbertia empetrifolia* subsp. *uncinata*	-
Dilleniaceae	*Hibbertia obtusifolia*	Grey Guinea Flower
Droseraceae	*Drosera auriculata*	Sundew
Droseraceae	*Drosera peltata*	Sundew
Droseraceae	*Drosera spathulata*	Common Sundew
Elaeocarpaceae	*Tetratheca juncea*^{TS}	Black-eyed Susan
Euphorbiaceae	*Poranthera microphylla*	
Fabaceae	*Melilotus indicus**	-
Fabaceae	*Trifolium repens**	White Clover
Gentianaceae	*Centaurium spicatum*	-
Gleicheniaceae	*Gleichenia dicarpa*	Pouched Coral Fern
Goodeniaceae	*Dampiera stricta*	Blue Dampiera
Goodeniaceae	*Goodenia bellidifolia*	Daisy-leaved Goodenia
Goodeniaceae	*Goodenia hederacea* subsp. *hederacea*	Ivy-leaved Goodenia
Goodeniaceae	*Goodenia heterophylla* subsp. *heterophylla*	Variable Leaved Goodenia
Goodeniaceae	*Goodenia ovata*	-
Goodeniaceae	*Goodenia stelligera*	-
Goodeniaceae	*Scaevola ramosissima*	Purple Fan Flower
Goodeniaceae	*Velleia spathulata*	-
Haemodoraceae	*Haemodorum corymbosum*	Bloodroot
Haemodoraceae	*Haemodorum planifolium*	Bloodroot
Haloragaceae	*Gonocarpus micranthus* subsp. *ramosissimus*	-
Haloragaceae	*Gonocarpus tetragynus*	Poverty Raspwort
Haloragaceae	*Gonocarpus teucroides*	Raspwort
Hypoxidaceae	*Hypoxis hygrometrica*	Golden Star
Iridaceae	*Patersonia glabrata*	Leafy Purple-flag
Iridaceae	*Patersonia sericea*	Wild Iris
Juncaceae	*Juncus bufonius*	Toad Rush
Juncaceae	*Juncus cognatus**	-
Juncaceae	*Juncus continuus*	-
Juncaceae	*Juncus usitatus*	Common Rush
Lindsaeaceae	*Lindsaea linearis*	Screw Fern

TABLE 2.1 (Cont.)
FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE
(Extracted from Bell and Murray 2007)

Lindsaeaceae	*Lindsaea microphylla*	Lacy Wedge-fern
Lobeliaceae	*Lobelia anceps*	-
Lobeliaceae	*Pratia purpurascens*	Whiteroot
Loganiaceae	*Mitrasacme polymorpha*	Mitrewort
Lomandraceae	*Lomandra confertifolia* subsp. *rubiginosa*	-
Lomandraceae	*Lomandra confertifolia var. pallida*	-
Lomandraceae	*Lomandra cylindrica*	-
Lomandraceae	*Lomandra filiformis* subsp. *coriacea*	Wattle Mat-rush
Lomandraceae	*Lomandra filiformis* subsp. *filiformis*	Wattle Mat-rush
Lomandraceae	*Lomandra glauca* subsp. *glauca*	-
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Lomandraceae	*Lomandra multiflora*	Many-flowered Mat-rush
Lomandraceae	*Lomandra obliqua*	Twisted Mat-rush
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne
Menyanthaceae	*Villarsia exaltata*	Yellow Marsh Flower
Orchidaceae	*Arthrochilus prolixus*	Elbow Orchid
Orchidaceae	*Caladenia carnea*	Pink Finger Orchid
Orchidaceae	*Caladenia catenata*	White Finger Orchid
Orchidaceae	*Caladenia picta*	-
Orchidaceae	*Calochilus campestris*	Copper Beard Orchid
Orchidaceae	*Calochilus robertsonii*	Purplish Beard Orchid
Orchidaceae	*Cryptostylis erecta*	Bonnet Orchid
Orchidaceae	*Cryptostylis subulata*	Large Tongue Orchid
Orchidaceae	*Dipodium punctatum*	Hyacinth Orchid
Orchidaceae	*Microtis parviflora*	Slender Onion Orchid
Orchidaceae	*Microtis unifolia*	Common Onion Orchid
Orchidaceae	*Orthoceras strictum*	Birds-mouth Orchid
Orchidaceae	*Pterostylis nutans*	Nodding Greenhood
Orchidaceae	*Thelymitra pauciflora*	Slender Sun Orchid
Oxalidaceae	*Oxalis perrenans*	-
Phormiaceae	*Dianella caerulea* var. *assera*	Flax Lily
Phormiaceae	*Dianella caerulea* var. *caerulea*	Flax Lily
Phormiaceae	*Dianella caerulea* var. *producta*	Blue Flax Lily
Phormiaceae	*Dianella longifolia*	-
Phormiaceae	*Dianella revoluta* var. *revoluta*	Spreading Flax Lily
Plantaginaceae	*Plantago lanceolata**	Ribwort
Plantaginaceae	*Veronica plebeia*	Creeping Speedwell
Poaceae	*Andropogon virginicus**	Whisky Grass
Poaceae	*Anisopogon avenaceus*	Oat Speargrass
Poaceae	*Aristida ramosa*	Wire Grass

TABLE 2.1 (Cont.)
FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE
(Extracted from Bell and Murray 2007)

Poaceae	*Aristida vagans*	Three-awn Speargrass
Poaceae	*Aristida warburgii*	Wire Grass
Poaceae	*Austrodanthonia linkii* var. *fulva*	Wallaby Grass
Poaceae	*Austrodanthonia tenuior*	Wallaby Grass
Poaceae	*Austrostipa pubescens*	Tall Speargrass
Poaceae	*Austrostipa scabra* subsp. *scabra*	Speargrass
Poaceae	*Axonopus fissifolius**	Narrow-leaf Carpet Grass
Poaceae	*Bothriochloa macra*	-
Poaceae	*Briza maxima**	Quaking Grass
Poaceae	*Briza minor**	Shivery Grass
Poaceae	*Chloris gayana**	Rhodes Grass
Poaceae	*Cortaderia selloana**	Pampas Grass
Poaceae	*Cymbopogon refractus*	Barbwire Grass
Poaceae	*Cynodon dactylon*	Common Couch
Poaceae	*Deyeuxia quadriseta*	Reed Bent Grass
Poaceae	*Dichelachne micrantha*	Short-hair Plume Grass
Poaceae	*Digitaria ramularis*	-
Poaceae	*Echinopogon caespitosus* var. *caespitosus*	Tufted Hedgehog Grass
Poaceae	*Echinopogon ovatus*	Forest Hedgehog Grass
Poaceae	*Entolasia marginata*	Bordered Panic
Poaceae	*Entolasia stricta*	Wiry Panic
Poaceae	*Eragrostis brownii*	Brown's Lovegrass
Poaceae	*Hemarthria uncinata var. uncinata*	Matgrass
Poaceae	*Imperata cylindrica* var. *major*	Blady Grass
Poaceae	*Joycea pallida*	Red Anther Wallaby Grass
Poaceae	*Lachnagrostis aemula*	Blown Grass
Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Rice Grass
Poaceae	*Notodanthonia longifolia*	Long-leaved Danthonia
Poaceae	*Oplismenus aemulus*	Basket Grass
Poaceae	*Oplismenus imbecillis*	-
Poaceae	*Panicum simile*	Two Colour Panic
Poaceae	*Paspalidium distans*	-
Poaceae	*Paspalum dilatatum**	Paspalum
Poaceae	*Paspalum orbiculare*	Ditch Millet
Poaceae	*Paspalum urvillei**	Vasey Grass
Poaceae	*Pennisetum clandestinum**	Kikuyu
Poaceae	*Phragmites australis*	Common Reed
Poaceae	*Plinthanthesis paradoxa*	
Poaceae	*Poa affinis*	-
Poaceae	*Poa labillardieri* var. *labillardieri*	Tussock Grass
Poaceae	*Poa seiberiana*	Tussock Grass

TABLE 2.1 (Cont.)
FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE
(Extracted from Bell and Murray 2007)

Poaceae	*Setaria gracilis**	Slender Pigeon Grass
Poaceae	*Sporobolus elongatus*	Slender Rat's Tail Grass
Poaceae	*Stenotaphrum secundatum**	Buffalo Grass
Poaceae	*Themeda australis*	Kangaroo Grass
Polygalaceae	*Comesperma sphaerocarpum*	-
Polygonaceae	*Persicaria decipiens*	Slender Knotweed
Polygonaceae	*Rumex crispus**	Curled Dock
Ranunculaceae	*Ranunculus lappaceus* var. *lappaceus*	Glossy Buttercup
Ranunculaceae	*Ranunculus plebeius*	Hairy Buttercup
Ranunculaceae	*Ranunculus repens**	Creeping Buttercup
Restionaceae	*Leptocarpus tenax*	Slender Twine-rush
Restionaceae	*Lepyrodia muelleri*	-
Restionaceae	*Lepyrodia scariosa*	Scale Rush
Rubiaceae	*Galium proquinquum*	Bedstraw
Rubiaceae	*Opercularia varia*	Variable Stinkweed
Sinopteridaceae	*Cheilanthes sieberi* subsp. *sieberi*	Poison Rock Fern
Solanaceae	*Solanum nigrum**	Black Nightshade
Stylidiaceae	*Stylidium graminifolium*	Trigger Plant
Stylidiaceae	*Stylidium lineare*	Trigger Plant
Thymelaeaceae	*Pimelea linifolia* subsp. *linifolia*	Slender Rice Flower
Verbenaceae	*Verbena bonariensis**	Purpletop
Violaceae	*Hybanthus monopetalus*	Slender Violet
Violaceae	*Viola betonicifolia*	-
Violaceae	*Viola hederacea*	Ivy-leaved Violet
Xanthorrhoaceae	*Xanthorrhoea fulva*	-
Xanthorrhoaceae	*Xanthorrhoea latifolia* subsp. *latifolia*	-
Xanthorrhoaceae	*Xanthorrhoea macronema*	-
Xanthorrhoaceae	*Xanthorrhoea resinosa* subsp. *resinosa*	-
EPIPHYTES		
Loranthaceae	*Amyema sp.*	Mistletoe
Loranthaceae	*Dendrophthoe vitellina*	Mistletoe
Loranthaceae	*Muellerina eucalyptoides*	Mistletoe
Orchidaceae	*Cymbidium suave*	Native Cymbidium
Orchidaceae	*Dendrobium aemulum*	White Feather Orchid
Polypodiaceae	*Pyrrosia rupestris*	Rock Felt Fern
WATERPLANTS		
Asteraceae	*Epaltes australis*	-
Cyperaceae	*Baumea articulata*	Jointed Twig-Rush

TABLE 2.1 (Cont.)
FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE
(Extracted from Bell and Murray 2007)

Cyperaceae	*Baumea juncea*	-
Cyperaceae	*Gahnia melanocarpa*	Black-fruit Saw-sedge
Cyperaceae	*Isolepis inundata*	Swamp Club-rush
Cyperaceae	*Isolepis nodosa*	-
Cyperaceae	*Lepidosperma neesii*	-
Cyperaceae	*Schoenus apogon*	Fluke Bog-rush
Goodeniaceae	*Goodenia paniculata*	Swamp Goodenia
Poaceae	*Pseudoraphis paradoxa*	Slender Mudgrass
Selaginallaceae	*Selaginella uliginosa*	Swamp Selaginella
Cyperaceae	*Baumea rubignosa*	Twig Rush
Cyperaceae	*Baumea teretifolia*	Wrinkle-nut Twig Rush
Cyperaceae	*Chorizandra cymbaria*	Heron Bristle Rush
Cyperaceae	*Chorizandra sphaerocephala*	Round-headed Bristle Rush
Cyperaceae	*Eleocharis sphacelata*	Tall Spike-rush
Cyperaceae	*Schoenoplectus mucronatus*	River Clubrush
Juncaginaceae	*Triglochin microtuberosum*	Water Ribbons
Phylydraceae	*Phylidrum lanuginosum*	Woolly Frogsmouth
Poaceae	*Paspalum distichum*	Water Couch
Restionaceae	*Empodisma minus*	-
Salviniaceae	*Salvinia molesta**	Salvinia
Typhaceae	*Typha orientalis*	Cumbungi
CLIMBERS		
Apocnyaceae	*Araujia sericifolia**	Mothvine
Apocynaceae	*Parsonsia straminea*	Common Silkpod
Bignoniaceae	*Pandorea pandorana*	Wonga Vine
Caprifoliaceae	*Lonicera japonica**	Japanese Honeysuckle
Convolvulaceae	*Polymeria calycina*	Bindweed
Dilleniaceae	*Hibbertia scandens*	Climbing Guinea-flower
Dioscoreaceae	*Dioscorea transversa*	Native Yam
Fabaceae	*Desmodium rhytidophyllum*	-
Fabaceae	*Glycine clandestina*	Twining Glycine
Fabaceae	*Glycine microphylla*	-
Fabaceae	*Glycine tabacina*	Twining Glycine
Fabaceae	*Hardenbergia violacea*	False Sarsparilla
Fabaceae	*Kennedia rubicunda*	Dusky Coral Pea
Lauraceae	*Cassytha glabella* forma *glabella*	Slender Devil's Twine
Lauraceae	*Cassytha pubescens*	Common Devil's Twine
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
Luzuriagaceae	*Geitonoplesium cymosum*	Scrambling Lily
Menispermiaceae	*Stephania japonica* var. *discolor*	Snake Vine
Pittosporaceae	*Billardiera scandens* var. *scandens*	Apple Dumplings

TABLE 2.1 (Cont.)
FLORA SPECIES OBSERVED WITHIN THE WHOLE OF THE WYONG EMPLOYMENT ZONE
(Extracted from Bell and Murray 2007)

Ranunculaceae	*Clematis glycinoides* var. *glycinoides*	Clematis
Rubiaceae	*Morinda jasminoides*	-
Smilacaceae	*Smilax australis*	Lawyer Vine
Smilacaceae	*Smilax glyciphylla*	Sarsaparilla
Vitaceae	*Cissus hypoglauca*	Water Vine

Species name^{TS} = Threatened Species * = Introduced Species

APPENDIX II

WEED MANAGEMENT TECHNIQUES

WEED MANAGEMENT TECHNIQUES

Weeds are to be progressively removed in accordance with the following techniques recommended by the National Trust, NSW National Parks and Wildlife Service and Australian Association of Bush Regenerators.

Woody Weeds Removal Techniques:

Cut and Paint

- Make a horizontal cut close to the ground using secateurs, loppers or a bush saw; and
- Immediately apply herbicide to the exposed flat stump surface.

Considerations:

- Cuts should be horizontal to prevent herbicide from running off the stump, sharp angle cuts are hazardous;
- Herbicide must be applied immediately before the plant cells close (within 30 seconds) and translocation of herbicide ceases;
- If plants re sprout, cut and paint the shoots after sufficient regrowth has occurred; and
- Stem scraping can be more effective on some woody weeds.

Stem Injection

- At the base of the tree drill 10mm diameter holes at a 45 degree angle into the sapwood;
- Fill each hole with herbicide immediately (within 30 seconds); and
- Repeat the process at 5 cm intervals around the tree.

Frilling or Chipping

- At the base of the tree make a cut into the sapwood with a chisel or axe;
- Fill each cut with herbicide immediately (within 30 seconds); and
- Repeat the process at 5 cm intervals around the tree.

Considerations:

- Plants should be actively growing and in good health;
- Deciduous plants should be treated in spring and autumn when leaves are fully formed;
- For multi-stemmed plants, inject or chip below the lowest branch or treat each stem individually; and
- Herbicides must be injected immediately before plant cells close (within 30 seconds) and translocation of herbicide ceases.

Small Hand-Pullable Plants Removal Techniques:

Hand Removal

- Remove any seeds or fruits and carefully place into a bag;
- Grasp stem at ground level, rock plant backwards and forwards to loosen roots and pull out; and
- Tap the roots to dislodge any soil, replace disturbed soil and pat down.

Considerations:

- Leave weeds so roots are not in contact with the soil eg. hang in a tree, remove from site or leave on a rock.

Vines and Scramblers Removal Techniques:

Hand Removal

- Take hold of one runner and pull towards yourself;
- Check points of resistance where fibrous roots grow from the nodes;
- Cut roots with a knife or dig out with a trowel and continue to follow the runner;
- The major root systems need to be removed manually or scrape/cut and painted with herbicide; and
- Any reproductive parts need to be bagged.

Stem Scraping

- Scrape 15 to 30 cm of the stem with a knife to reach the layer below the bark/outer layer; and
- Immediately apply herbicide along the length of the scrape.

Considerations:

- A maximum of half the stem diameter should be scraped. Do not ringbark;
- Larger stems should have two scrapes opposite each other; and
- Vines can be left hanging in trees after treatment.

Weeds with Underground Reproductive Structures Removal Techniques:

Hand Removal of Plants with a Taproot

- Remove and bag seeds or fruits;
- Push a narrow trowel or knife into the ground beside the tap root, carefully loosen the soil and repeat this step around the taproot;
- Grasp the stem at ground level, rock plant backwards and forwards and gently pull removing the plant; and
- Tap the roots to dislodge soil, replace disturbed soil and pat down.

Crowning

- Remove and bag stems with seed or fruit;
- Grasp the leaves or stems together so the base of the plant is visible;
- Insert the knife or lever at an angle close to the crown;
- Cut through all the roots around the crown; and
- Remove and bag the crown.

Herbicide Treatment – Stem Swiping

- Remove any seed or fruit and bag; and
- Using a herbicide applicator, swipe the stems/leaves.

Considerations:

- Further digging may be required for plants with more than one tuber;
- Some bulbs may have small bulbils attached or present in the soil around them which need to be removed;
- It may be quicker and more effective to dig out the weed;
- Protect native plants and seedlings; and
- For bulb and corm species the most effective time to apply herbicide is after flowering and before fruit is set.

Exotic vegetation should be removed and stockpiled in a clear area away from adjoining retained bushland. This stockpile should be removed from the site as soon as possible. As part of the regular maintenance of the restored area any regrowth of the exotic plant species should be removed and disposed of appropriately.

Use of Herbicides
Herbicides should not be applied 0 to 12 hours prior to rain occurring. This reduces the herbicides effectiveness as well as being transported in runoff to creeklines and waterways.

An advantage of herbicide use is the low time taken to spray weeds as compared to physically removing them, particularly for large infestations of weeds.

Buchanan (1989) recommends that the use of herbicides should be considered when:

1. there are small areas of dense weeds with few or no native plants to protect;
2. there are large areas of weeds;
3. the weeds are growing too rapidly for physical removal; and
4. the weeds are located in areas with a high potential for erosion if vegetation is removed.

The spraying of weeds must only be undertaken by persons with Chemcert or equivalent qualifications. The success of each treatment must be evaluated by the operator after a set period of time according to the labelled effectiveness for each herbicide. Care must be taken when applying herbicides near drainage lines to avoid excess use due to the sensitivity of the wetlands and waterways into which runoff will eventually flow.