

## **WEED MANAGEMENT PLAN**

**PART OF LOT 4  
DP 771597 & PORTION 4  
OFF LEO DRIVE,  
NARRAWALLEE**

**MAY 2005  
(REF: 5134)**

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**MAY 2005**

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## PREFACE

This Weed Management Plan has been prepared by *Conacher Travers Pty Ltd* to identify matters in relation to the management of weeds on the site as part of Lot 4 DP 771597 and Portion 4 off Leo drive, Narrawallee.

It is proposed to subdivide lands to the west of Leo Drive, Narrawallee, with the proposed subdivision consisting of several large residential allotments and includes the establishment of the necessary infrastructure such as roads and water supply. The subdivision is an extension of an existing residential area that is already established within the area as part of Narrawallee urban development area.

This Weed Management Plan is based on best management practice for development within and adjacent to remnant bushland zones and aims to reduce the current area of weed invasion and to prevent potential weed incursion from the boundary of the development area into the surrounding natural vegetation, which is a Sydney Coastal Swamp Forest Complex.

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# SECTION 1

## INTRODUCTION

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This *Weed Management Plan* has been prepared by *Conacher Travers Pty Ltd* to identify matters in relation to the management of weeds on the site as part of the proposed residential subdivision of Lot 4 DP 771597 and Portion 4 off Leo Drive, Narrawallee, within the Shoalhaven Local Government Area.

For the purpose of discussion within this report areas of the site will be referred to as follows:

- The 'subject site' is the area of the proposed development; and
- The 'study area' consists of the subject site and land to the west, north-west and north of the subject site.

### 1.1 OBJECTIVES

The purpose of this Weed Management Plan is to:

- To provide general management prescriptions using techniques such as slashing and spot spraying to control and reduce areas of current weed invasion within the subject site;
- To provide target weed control management prescriptions using low impact techniques aimed at preventing weed invasion in a buffer strip along the western and northern boundaries of the proposed development area;
- To provide target weed control management prescriptions using low impact techniques within the Endangered Ecological Community (EEC) outside of the subject site (development area) but within the study area.

### 1.2 PROPOSED DEVELOPMENT

It is proposed to subdivide the subject site for residential purposes. The proposal provides for a high level of water management to protect low lying areas to the west. These measures are identified by J. Wyndham Prince Pty Ltd.

Conacher Travers (2003) has also recommended appropriate bushfire protection measures for the proposal. The impacts of these measures, including Asset Protection Zones have been taken into consideration as part of the impact assessment within this report.

## SECTION 2

### MANAGEMENT CONTEXT

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#### 2.1 SITE DESCRIPTION

##### *Location*

The subject site is situated on the western side of Leo Drive and to the north of Seaspray Street, Narrawallee. Approximate AMG coordinates of the study area are 269500E and 6088500N. The site is bounded by residential development to the east and south east, and by native vegetation to the north, west and south west. The site encompasses an area of approximately 100 hectares (ha).

##### *Geology*

The subject site is mapped by Sydney Basin 1:500,000 Geological Sheet as siltstone and silty sandstone (Psc) and gravel, sand, silt and clay (Qa) (Brunker & Rose, 1967).

The soils within the site contained sandy loam and clay with fragments of siltstone.

##### *Topography and Drainage*

The study area is situated on low ridgeline aligned north to south forming a slope at the northern end. The western side of the ridgeline drains west north-west into a watercourse along the western side forming a narrow arm of Narrawallee Wetlands to the north. The eastern side of the ridgeline drains generally east and north east into residential development.

Gradients of the site are generally 10 to 25% with lower gradients along the ridge top. The elevation of the site is generally between 10 and 30 metres Australian Height Datum (AHD).

##### *Vegetation*

The site is naturally vegetated containing predominantly tall forest. The site is bound to the north and west by natural vegetation. Areas to the south and east contain residential development.

Three vegetation communities were identified within the study area (Conacher Travers, 2003). These include:

- Blackbutt Tall Forest (Dense Understorey) (1);
- Fresh Treed Swampland (2); and
- Blackbutt Tall Forest (Open Understorey) (3).

Details of the native and exotic flora observed on site are provided in Appendix 1.

##### *Conservation Reserves*

The nearest conservation reserves are Narrawallee Creek Nature Reserve approximately 300 metres to the north and Morton National Park, approximately 13 km to the west.

## *Land Use*

The study area landscape has been affected by the following impacts:

- *Clearing:* An area at the southern end of the site has been clear for excavations and small areas throughout the site have been cleared for vehicular tracks;
- *Bushfire:* There are no signs of recent bushfire;
- *Agriculture:* There is anecdotal evidence of past intensive grazing in the southern two thirds of the site but at the time of the survey that area was covered with natural vegetation and was not being used for any purpose;
- *Earthworks:* Excavations have been made in a small area in the southern part of the site;
- *Introduced weeds:* the subject site contains a moderate incursion of weeds predominantly along the southern and eastern boundaries adjoining residential development; and
- *Feral, Introduced and Domestic Fauna:* Native fauna within the subject site is likely to have been impacted upon by the predation of European Red Fox (*Vulpes vulpes*), Cats (*Felis catus*) and Dogs (*Canis familiaris*).

## **2.2 THE IMPORTANCE OF VEGETATION AREAS**

Remnant vegetation is important to the community for a variety of reasons. These values include: natural heritage; nature conservation; protection of riparian corridors; environmental role; educational/scientific importance; recreational and scenic values.

## SECTION 3

### VEGETATION MANAGEMENT ISSUES

#### 3.1 WEEDS AND BUSHLAND REHABILITATION

Environments undergoing development often provide many opportunities for exotic species to establish and grow. The main source of exotic species generates from garden refuse and green waste being dumped into native vegetation.

The principal mechanisms for weeds establishing in an area include:

- Elevated nutrients in stormwater runoff ;
- Physical disturbances to the soil;
- Increased soil moisture from shading / reduced water infiltration; and
- Increased light at the margins of vegetation.

The vegetation on the subject site includes some weed species. These are concentrated in Vegetation Community 1 - Blackbutt Tall Forest (Dense Understorey). A list of exotic species within the study area is provided in Table 1.

**Table 1: Exotic Flora in the Study Area**

| Scientific Name                    | Common Name   | Vegetation Community <sup>1</sup> |
|------------------------------------|---------------|-----------------------------------|
| <i>Andropogon virginicus</i>       | Whisky Grass  | 1                                 |
| <i>Bidens pilosa</i>               | Cobblers Pegs | 1                                 |
| <i>Briza maxima</i>                | Quaking Grass | 1                                 |
| <i>Chrysanthemoides monilifera</i> | Bitou Bush    | 1                                 |
| <i>Cirsium vulgare</i>             | Spear Thistle | 1                                 |
| <i>Conyza albida</i>               | Tall Fleabane | 1                                 |
| <i>Holcus lanatus</i>              | Yorkshire Fog | 1                                 |
| <i>Hydrocotyle bonariensis</i>     | Pennywort     | 1                                 |
| <i>Hypochaeris glabra</i>          | -             | 1                                 |
| <i>Hypochaeris radicata</i>        | Flatweed      | 1& 2                              |
| <i>Lilium formosanum</i>           | -             | 1                                 |
| <i>Osteospermum ecklonis</i>       | -             | 1                                 |
| <i>Paspalum urvillei</i>           | Vasey Grass   | 1                                 |
| <i>Pennisetum clandestinum</i>     | Kikuyu        | 1                                 |
| <i>Plantago lanceolata</i>         | Ribwort       | 1                                 |
| <i>Senna pendula</i>               | Cassia        | 1                                 |
| <i>Stellaria media</i>             | Chickweed     | 1                                 |
| <i>Stenotaphrum secundatum</i>     | Buffalo Grass | 1                                 |
| <i>Trifolium repens</i>            | White Clover  | 1                                 |

1. Vegetation Community 1 – Blackbutt Tall Forest (Dense Understorey);  
Vegetation Community 2 – Fresh Treed Swampland;  
Vegetation Community 3 – Blackbutt Tall Forest (Open Understorey).



In general, to maintain or improve the current condition of the retained bushland, the following restrictions need to be enforced including:

#### **Weed Management**

- All weeds need to be eradicated and controlled within any APZ or Riparian Zones.
- Garden waste, weed propagules (seeds, tubers etc.) need to be periodically collected and disposed of at an approved waste transfer facility, and should not be dumped on adjacent bushland or allowed to be washed downstream.

#### **Nutrient Management**

- Lawn fertilizers, manure (horse or chicken) are not to be spread or stockpiled within 40m of a drainage line or the bushland including for the purposes of vegetable gardens or landscaping.
- Drainage from lawns, manure and chicken coops should be allowed to filter through a grassed swale prior to discharge into local drainage lines.

#### **Erosion Control/Sedimentation Management**

- All bare soil areas need to be stabilised with a nurse crop of inert or sterile Japanese Millet, Rye Corn and native grasses or re-vegetated immediately with appropriate local native plants.
- Sediment fences are to be installed around all construction works prior to commencement of any earthworks.
- Sediment basins (if necessary) are to be installed prior to commencement of construction works.

#### **Restoration of disturbed areas (if necessary)**

- Close any redundant fire trails or tracks.
- Install filter or sediment fences at key drainage points.
- Brush mat bare areas with seed laden native brush harvested from the site.
- Maintain in a weed-free condition for 2 years using low impact weed control methods (bush regeneration) (refer to Appendix 2).
- Restoration within riparian corridors should be commensurate with natural streams in terms of species diversity, and plant cover or density and asset protection zones.

The promotion of vegetation regeneration within the bushland should be encouraged, in preference to the introduction of plant material through planting regimes. However, where soils or vegetation are significantly disturbed by exotic species or waste removal, suitable locally occurring native (endemic) bushland species are to be used to replace lost vegetation.

Where public access is likely, the erection of signs around conservation areas are needed to encourage appropriate activities suited within and adjacent to the bushland or significant vegetation stands.

## SECTION 4

### WEED MANAGEMENT PLAN

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The primary aims of the weed control program for this site are to reduce the current area of weed invasion within the subject site and to prevent potential weed incursion from the boundary of the development area into the surrounding natural vegetation, which is a Sydney Coastal Swamp Forest Complex (an EEC). The current area of weed invasion is concentrated along the southern and eastern boundaries of the subject site and in the current cleared trail areas within the site (Figure 1).

A program of targeted weed control should be performed for the duration of the pre-construction, construction, post construction phases and for a 12 month maintenance period after completion of construction works.

#### 4.1 WEED CONTROL AREAS AND TECHNIQUES

Weed control is defined as the removal or control of weeds using hand removal and/or the application of selected herbicides. In specific circumstances, the use of machinery is used when the extent of the infestation is very large and will not cause significant erosion or destabilisation. Weeding techniques should be appropriate to the weed type, growth form and to the existing site conditions.

Wherever possible, weed removal should be carried out prior to annual seed set. Herbicide application via stem injection or foliar spray must not be applied to plants bearing ripe or semi-ripe fruit. It is important to plan herbicide control of target species according to a weeding calendar that recognises the weed's life form and seasonality (i.e. flowering, fruiting and seed set).

The study area has been divided into three (3) distinct areas for weed control purposes (see Figure 1). These include:

- (1) *Weed Control Area 1*: Area of Sydney Coastal Swamp Forest (EEC) within the study area that is located to the north and west of the subject site (development area);
- (2) *Weed Control Area 2*: Buffer zone strip along the subject site boundary; and
- (3) *Weed Control Area 3*: Area within the subject site (development area).

Exotic species in Weed Control Area 1 are to be progressively removed in accordance with low impact techniques (Appendix 2) recommended by the National Trust, NSW Department of Environment and Conservation and the Australian Association of Bush Regenerators.

It is recommended that natural recruitment of the tree, shrub and groundcover layers be facilitated by the removal of weed species within areas presently occupied by native vegetation. Exotic species specifically targeted for removal are listed in Table 1.

Exotic species in Weed Control Area 2 (Buffer strip along the subject site boundary) are also to be progressively removed using low impact techniques outlined in Appendix 2. It is also recommended that only native grasses be planted if required in this buffer zone. Highly invasive exotic grass species such as Kikuyu, Couch and Buffalo Grasses are to be avoided.

In Weed Control Area 3 (development area), high impact techniques such as slashing and spot spraying may be used to eradicate and control exotic species. The current areas of weed invasion are marked on Figure 1. These areas should be targeted for noxious weeds and exotic flora, in particular Whiskey Grass, Bitou Bush and Quaking Grass (Table 1).

#### **4.2 WEED CONTROL PROGRAM TIMING**

The primary stages of the weeding phase of this plan are estimated to take approximately 3 months, while the secondary and ongoing maintenance stage for the restoration process should continue for at least 12 months in order to achieve effective control. Maintenance and regeneration should continue after this period on a needs basis.

- *Primary Weeding* – consists of initial weed clearance, through hand weeding and/or the use of herbicides.
- *Secondary or Follow-up Weeding* – consists of the maintenance of sites which have already received primary weeding.
- *Maintenance weeding* – consists of the monitoring/removal of weed re-growth and care of native plant seedlings (naturally occurring and planted).

All areas targeted for weed removal should target any species likely to significantly invade bushland, prevent natural regeneration, or impede native seedling growth. Priority shall be given to species listed as 'noxious plants' in the Shoalhaven Shire Council LGA in the Schedules of the *NSW Noxious Weeds Act 1993* (e.g. Bitou Bush).

Disposal of weed debris and other rubbish generated as a result of the work shall be the responsibility of the Contractor. Costs for disposal of rubbish (collection and tipping fees) shall be clearly stated in the tender proposal.

Disposal of weed material via burns piles is permitted only after approval has been obtained from the Project Superintendent. Any burning must be carried out as advised by the Environment Protection Authority and NSW Fire Brigade.

#### **4.3 MONITORING AND REVIEW**

It is recommended that regular monitoring inspections be undertaken at 6 months, 1 year and 2 years post construction. This will allow the determination of the condition of the vegetation including identification of any areas suffering from disturbance or in need of rehabilitation and weed control.

#### **4.4 ESTIMATED COST OF WORKS**

Competitive quotations from suitably qualified Bush Regenerators or Landscape contractors should be sought.

#### **4.5 PROTECTION OF ENDANGERED ECOLOGICAL COMMUNITIES (EECs)**

Weed Control Area 2 establishes a buffer zone of protection between the EEC (Sydney Coastal Swamp Forest) and the development area. A fence should be erected along the inner boundary of Weed Control Area 2 (the subject site boundary) (see Figure 1) in order to restrict access, and thus minimise weed incursions, into the EEC area.

## **SECTION 5**

### **CONCLUSIONS**

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This Weed Management Plan is based on best management practice for development within and adjacent to remnant bushland zones and aims to reduce the current area of weed invasion and to prevent potential weed incursion from the boundary of the development area into the surrounding natural vegetation, which is a Sydney Coastal Swamp Forest Complex.

The study area has been divided into three specific weed control areas. Two of these weed control areas are to have exotic species progressively removed in accordance with low impact techniques recommended by the National Trust, NSW Department of Environment and Conservation and the Australian Association of Bush Regenerators. Higher impact techniques such as slashing and spot spraying are to be used in the third weed control area (the development area).

The primary stages of the weeding control plan are estimated to take approximately 3 months, while the secondary and ongoing maintenance stage for the restoration process should continue for at least 12 months in order to achieve effective control. Maintenance and regeneration should continue after this period on a needs basis.

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## **APPENDIX 1**

### **FLORA CHARACTERISTICS**

**EXTRACTED FROM: *FLORA AND FAUNA ASSESSMENT*  
(Conacher Travers Pty Ltd, March 2003, Ref: 2308F)**

**Table A1.1 - Native Flora Observations for the study area**

| Scientific Name                  | Common Name            | Community |
|----------------------------------|------------------------|-----------|
| <b>Trees</b>                     |                        |           |
| <i>Angophora floribunda</i>      | Rough-barked Apple     | 2 3       |
| <i>Casuarina glauca</i>          | Swamp Oak              | 2         |
| <i>Corymbia gummifera</i>        | Red Bloodwood          | 1 2 3     |
| <i>Eucalyptus longifolia</i>     | Woollybutt             | 2         |
| <i>Eucalyptus pilularis</i>      | Blackbutt              | 1 2 3     |
| <i>Eucalyptus robusta</i>        | Swamp Mahogany         | 2         |
| <i>Livistona australis</i>       | Cabbage Tree Palm      | 2         |
| <i>Syncarpia glomulifera</i>     | Turpentine             | 1 2 3     |
| <b>Shrubs</b>                    |                        |           |
| <i>Acacia longifolia</i>         | Sydney Golden Wattle   | 1 2 3     |
| <i>Acacia mearnsii</i>           | Black Wattle           | 1 3       |
| <i>Acacia myrtifolia</i>         | Red-stem Wattle        | 1 3       |
| <i>Acacia suaveolens</i>         | Sweet Scented Wattle   | 1 3       |
| <i>Acacia terminalis</i>         | Sunshine Wattle        | 1         |
| <i>Allocasuarina littoralis</i>  | Black She-oak          | 1 3       |
| <i>Aotus ericoides</i>           | -                      | 3         |
| <i>Banksia integrifolia</i>      | Honeysuckle            | 1         |
| <i>Banksia serrata</i>           | Old Man Banksia        | 1 3       |
| <i>Banksia spinulosa</i>         | Hairpin Banksia        | 1 3       |
| <i>Bossiaea obcordata</i>        | Spiny Bossiaea         | 1         |
| <i>Breynia oblongifolia</i>      | Breynia                | 1 3       |
| <i>Callicoma serratifolia</i>    | Black Wattle           | 1 2       |
| <i>Cassinia quinquefaria</i>     | -                      | 1         |
| <i>Dodonaea triquetra</i>        | Hop Bush               | 1 3       |
| <i>Glochidion ferdinandi</i>     | Cheese Tree            | 1 2       |
| <i>Gompholobium latifolium</i>   | Golden Glory Pea       | 1 3       |
| <i>Goodenia ovata</i>            | Hop Goodenia           | 2         |
| <i>Hakea salicifolia</i>         | Willow Hakea           | 1         |
| <i>Hibbertia aspera</i>          | -                      | 1 2 3     |
| <i>Hibbertia obtusifolia</i>     | -                      | 1 3       |
| <i>Kunzea ambigua</i>            | Tick Bush              | 1 2 3     |
| <i>Leptospermum continentale</i> | -                      | 1 Q2      |
| <i>Leptospermum juniperinum</i>  | Prickly Tea-tree       | 2 3       |
| <i>Leucopogon lanceolatus</i>    | Lance-leaf Beard-heath | 1 3       |
| <i>Melaleuca armillaris</i>      | -                      | 1         |
| <i>Melaleuca ericifolia</i>      | -                      | 2         |
| <i>Melaleuca hypericifolia</i>   | -                      | 1         |
| <i>Melaleuca linariifolia</i>    | Snow in Summer         | 2         |
| <i>Monotoca elliptica</i>        | Tree Broom-heath       | 3         |
| <i>Omphacomeria acerba</i>       | Leafless Sourbush      | 1 3       |
| <i>Ozothamnus diosmifolius</i>   | Ball Everlasting       | 2         |
| <i>Persoonia linearis</i>        | Narrow-leaved Geebung  | 3         |
| <i>Persoonia mollis</i>          | -                      | 1 2 3     |
| <i>Petrophile pedunculata</i>    | Conesticks             | 1         |
| <i>Phyllanthus hirtellus</i>     | Thyme Spurge           | 1 3       |
| <i>Pimelea linifolia</i>         | Slender Rice Flower    | 1 3       |
| <i>Pittosporum revolutum</i>     | Yellow Pittosporum     | 3         |
| <i>Pittosporum undulatum</i>     | Sweet Pittosporum      | 1         |
| <i>Platylobium formosum</i>      | Handsome Flat-pea      | 1         |

**Table A1.1 - Native Flora Observations for the study area (Cont.)**

| Scientific Name                  | Common Name            | Community |
|----------------------------------|------------------------|-----------|
| <b>Shrubs (Cont.)</b>            |                        |           |
| <i>Platysace lanceolata</i>      | Lance-leaf Platysace   | 1 3       |
| <i>Podolobium ilicifolium</i>    | Native Holly           | 1 3       |
| <i>Pultenaea daphnoides</i>      | Large-leaf Bush Pea    | 1         |
| <i>Pultenaea flexilis</i>        | -                      | 1 2       |
| <i>Pultenaea retusa</i>          | -                      | 1 3       |
| <i>Ricinocarpus pinifolius</i>   | Wedding Bush           | 3         |
| <i>Wilkiea huegeliana</i>        | Wilkiea                | 1 3       |
| <i>Zieria smithii</i>            | Sandfly Zieria         | 1 2 3     |
| <b>Vines</b>                     |                        |           |
| <i>Baloskian tetraphyllum</i>    | Tassel-rush            | 2 3       |
| <i>Billardiera scandens</i>      | Apple Dumplings        | 1 3 2     |
| <i>Cassytha pubescens</i>        | Devil's Twine          | 2 3       |
| <i>Cissus hypoglauca</i>         | Water Vine             | 3         |
| <i>Clematis aristata</i>         | Clematis               | 3         |
| <i>Eustrephus latifolius</i>     | Wombat Berry           | 1         |
| <i>Glycine clandestina</i>       | Twining Glycine        | 1 2 3     |
| <i>Gleichenia dicarpa</i>        | Pouched Coral Fern     | 1 2       |
| <i>Glycine clandestina</i>       | Twining Glycine        | 1 2 3     |
| <i>Hardenbergia violacea</i>     | False Sarsparilla      | 1 3       |
| <i>Hibbertia dentata</i>         | Twining Guinea Flower  | 1         |
| <i>Hibbertia scandens</i>        | Climbing Guinea Flower | 1 2 3     |
| <i>Kennedia rubicunda</i>        | Dusky Coral Pea        | 1 2       |
| <i>Marsdenia suaveolens</i>      | Scented Marsdenia      | 1 3       |
| <i>Parsonsia straminea</i>       | Common Silkpod         | 2         |
| <i>Smilax glycyphylla</i>        | Sarsparilla            | 1 2       |
| <b>Herbs</b>                     |                        |           |
| <i>Acianthus fornicatus</i>      | Pixie Caps             | 3         |
| <i>Amperea xiphoclada</i>        | Broom Spurge           | 3         |
| <i>Anisopogon avenaceus</i>      | Oat Spear Grass        | 1         |
| <i>Burchardia umbellata</i>      | Milkmaids              | 1         |
| <i>Caladenia carnea</i>          | Pink Finger Orchid     | 1 3       |
| <i>Capillipedium parviflorum</i> | Scented-top Grass      | 1         |
| <i>Cryptostylis erecta</i>       | Bonnet Orchid          | 3         |
| <i>Cymbidium suave</i>           | Native Cymbidium       | 3         |
| <i>Cynodon dactylon</i>          | Common Couch           | 1         |
| <i>Desmodium variens</i>         | Slender Tick-trefoil   | 3         |
| <i>Dianella caerulea</i>         | Flax Lily              | 1 2 3     |
| <i>Dichondra repens</i>          | Kidney Weed            | 3         |
| <i>Drosera auriculata</i>        | Sundew                 | 1 3       |
| <i>Echinopogon caespitosus</i>   | Tufted Hedgehog Grass  | 3         |
| <i>Entolasia marginata</i>       | Bordered Panic         | 1 3       |
| <i>Entolasia stricta</i>         | Wiry Panic             | 1 2       |
| <i>Eragrostis brownii</i>        | Brown's Lovegrass      | 1 3       |
| <i>Gahnia clarkei</i>            | Saw Sedge              | 2         |
| <i>Gahnia sieberiana</i>         | Red-fruited Saw-sedge  | 1 3       |
| <i>Gonocarpus teucroides</i>     | Raspwort               | 1 2 3     |
| <i>Hybanthus vernonii</i>        | Slipper Violet         | 1 3       |
| <i>Hydrocotyle peduncularis</i>  | Pennywort              | 2         |
| <i>Imperata cylindrica</i>       | Blady Grass            | 1 3       |
| <i>Juncus usitatus</i>           | Common Rush            | 2         |



**Table A1.1 - Native Flora Observations for the study area (Cont.)**

| Scientific Name                | Common Name             | Community |
|--------------------------------|-------------------------|-----------|
| <b>Herbs (Cont.)</b>           |                         |           |
| <i>Lagenifera gracilis</i>     | -                       | 1 3       |
| <i>Lepidosperma filiforme</i>  | Common Rapier Sedge     | 1 2       |
| <i>Lomandra longifolia</i>     | Spiky-headed Mat-rush   | 1 3       |
| <i>Lomandra multiflora</i>     | Many-flowered Mat-rush  | 1 3       |
| <i>Lomandra obliqua</i>        | Twisted Mat-rush        | 3         |
| <i>Macrozamia communis</i>     | Burrawang               | 3         |
| <i>Panicum simile</i>          | Two Colour Panic        | 1 3       |
| <i>Patersonia sericea</i>      | Wild Iris               | 1         |
| <i>Poranthera ericifolia</i>   | Heath-leaved Poranthera | 1         |
| <i>Pratia purpurascens</i>     | Whiteroot               | 2 3       |
| <i>Pseudoraphis paradoxa</i>   | Slender Mudgrass        | 2         |
| <i>Schoenus melanostachys</i>  | Black Bog-rush          | 1         |
| <i>Sowerbaea juncea</i>        | Vanilla Lily            | 1 3       |
| <i>Stackhousia monogyna</i>    | Creamy Candles          | 1         |
| <i>Tetradlea thymifolia</i>    | Black-eyed Susan        | 1         |
| <i>Thelymitra ixioides</i>     | Spotted Sun Orchid      | 1         |
| <i>Themeda australis</i>       | Kangaroo Grass          | 1 3       |
| <i>Trachymene incisa</i>       | -                       | 1 3       |
| <i>Villarsia exaltata</i>      | Yellow Marsh Flower     | 2         |
| <i>Xanthorrhoea resinifera</i> | -                       | 1 3       |
| <b>Ferns</b>                   |                         |           |
| <i>Adiantum aethiopicum</i>    | Common Maidenhair       | 1         |
| <i>Blechnum camfieldii</i>     | -                       | 2         |
| <i>Blechnum cartilagineum</i>  | Gristle Fern            | 3         |
| <i>Blechnum indicum</i>        | Swamp Water-fern        | 2         |
| <i>Calochlaena dubia</i>       | Common Ground Fern      | 1 2 3     |
| <i>Gleichenia dicarpa</i>      | Pouched Coral Fern      | 1 2       |
| <i>Lindsaea linearis</i>       | Screw Fern              | 1 3       |
| <i>Pteridium esculentum</i>    | Bracken Fern            | 1 3       |
| <i>Selaginella uliginosa</i>   | Swamp Selaginella       | 3         |

**Table A1.2 - Exotic Flora Observations for the study area**

| <b>Scientific Name</b>             | <b>Common Name</b> | <b>Community</b> |
|------------------------------------|--------------------|------------------|
| <i>Andropogon virginicus</i>       | Whisky Grass       | 1                |
| <i>Bidens pilosa</i>               | Cobblers Pegs      | 1                |
| <i>Briza maxima</i>                | Quaking Grass      | 1                |
| <i>Chrysanthemoides monilifera</i> | Bitou Bush         | 1                |
| <i>Cirsium vulgare</i>             | Spear Thistle      | 1                |
| <i>Conyza albida</i>               | Tall Fleabane      | 1                |
| <i>Holcus lanatus</i>              | Yorkshire Fog      | 1                |
| <i>Hydrocotyle bonariensis</i>     | Pennywort          | 1                |
| <i>Hypochaeris glabra</i>          | -                  | 1                |
| <i>Hypochaeris radicata</i>        | Flatweed           | 1 2              |
| <i>Lilium formosanum</i>           | -                  | 1                |
| <i>Osteospermum ecklonis</i>       | -                  | 1                |
| <i>Paspalum urvillei</i>           | Vasey Grass        | 1                |
| <i>Pennisetum clandestinum</i>     | Kikuyu             | 1                |
| <i>Plantago lanceolata</i>         | Ribwort            | 1                |
| <i>Senna pendula</i>               | Cassia             | 1                |
| <i>Stellaria media</i>             | Chickweed          | 1                |
| <i>Stenotaphrum secundatum</i>     | Buffalo Grass      | 1                |
| <i>Trifolium repens</i>            | White Clover       | 1                |

**APPENDIX 2**

**WEED MANAGEMENT TECHNIQUES**

## **WEED MANAGEMENT TECHNIQUES FOR USE IN AREAS OF NATIVE VEGETATION RETENTION**

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

### **1- Woody Weeds Removal Techniques:**

#### Cut and Paint (Woody weeds to 10 cm basal diameter)

- 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 resprout cut and paint the shoots after sufficient re-growth has occurred; and
- Stem scraping can be more effective on some woody weeds.

#### Stem Injection

- At the base of the tree drill holes at a 45 degree angle into the sapwood;
- Fill each hole with herbicide immediately; 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; 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.

### **2- 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, e.g. hang in a tree, remove from site or leave on a rock.

### 3- 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.

### 4- 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 an 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 bushland. This stockpile should be removed from the site at a convenient time. As part of the regular maintenance of the restored area any re-growth of the exotic plant species should be removed and disposed of appropriately.

### **5- Use of Herbicides**

Herbicides should not be applied 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.

*Conacher Travers* 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 spraying of weeds must only be undertaken by experienced persons with Chemcert or equivalent qualifications. The success of each treatment must be evaluated by the operator after a set period of time and re-applied (if necessary) according to the labeled effectiveness for each herbicide. Care must be taken when applying herbicides near drainage lines to avoid excess use due to the sensitivity of the waterbodies into which runoff will eventually flow.





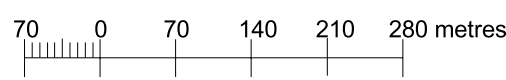


### Legend

- |  |  |  |  |  |   |
|--|--|--|--|--|---|
|  | Study Area Boundary  |  | Blackbutt Tall Forest (Open Understorey)               |  | Weed Control Area 1 (Low Impact Weed Control)               |
|  | *Subject Site Boundary   |  | Blackbutt Tall Forest (Dense Understorey)              |  | Weed Control Area 2 (Buffer Zone - Low Impact Weed Control) |
|  | Vegetation Community Boundary  |  | Bitou Bush - <i>Chrysanthemoides monilifera</i> (2003) |  | Weed Control Area 3 (Slash and Spot Spraying Weed Control)  |
|  | South Eastern Boundary of Sydney Coastal Swamp Forest Complex (Fixed by land survey) |  | Protective Fencing                                     |  | Current Area of Weed Invasion                               |

Flora and fauna survey locations are approximate and have not been fixed by land survey, unless otherwise indicated.

\*Subject Site boundary subject to final survey



Scale 1:7,000  
Original plan produced in A3 colour



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**Figure 1 -  
Weed Management Plan,  
Leo Drive, Narrawallee**

Fig 1: A3P  
05/05/05  
Ref.No.2308

Source: DLWC 1:25,000 Aerial Photograph, Ulladulla 1:50,000 NSW4533 (M2243) Run 5, Frame 187 dated 20/12/00; Leo Drive, Narrawallee