



Bingara Gorge Development Area, Wilton

Weed Eradication Management Plan

Prepared for
Lend Lease Communities Wilton Pty Ltd

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Abbreviations

Abbreviation	Description
ELA	Eco Logical Australia
WEMP	Weed Eradication Management Plan

1 Introduction

This Weed Eradication Management Plan (WEMP) has been prepared by Eco Logical Australia (ELA), on behalf of Lend Lease Communities Wilton Pty Ltd for the proposed development of Bingara Gorge, Wilton, hereafter referred to as the 'subject site' (**Figure 1**). This plan ensures the management of both noxious and environmental weeds within the subject site and will be submitted to Wollondilly Shire Council as part of the Development Application (DA) for the Bingara Gorge Development areas referred to as Greenbridge East, Golf Town and Bushland.

1.1 Description of project

The proposed works involve the construction of a residential lot subdivision, with associated roads and walkways. As part of the proposed works, weed management will be carried out in accordance with this WEMP.

The objective of the NW Act is to reduce the negative impacts of weeds on the economy, community and environment by establishing control mechanisms that:

- prevent the establishment of significant new weeds
- prevent, eliminate or restrict the spread of particular significant weeds
- effectively manage widespread significant weeds

1.2 Scope and objectives

This WEMP has been prepared to meet the requirements of Court condition (1(5)(c)(vi) which states:

- A Weed Eradication and Management Plan (WEMP) prepared by suitably qualified and experienced person(s) to include:
- An inventory of all Noxious and Environmental weeds on the proposed development site and a site plan indicating the weed infestations with reference to the species and degree of infestation (i.e.. low, medium, high);
- A treatment schedule, specifying for each species:
 - (i) The method of treatment (mechanical, herbicide use or cultural such as pasture improvement or grazing);
 - (ii) The rates of application methods of all herbicide treatments;
 - (iii) The primary control treatment to achieve a minimum 70% kill and a secondary control treatment to achieve a minimum 90% kill; and
 - (iv) The timing of treatments.
- A agreed maintenance program indicating the methods to be implemented to maintain a weed-free site updated from time to time;
- Details of any methods of disposal of weed material.

In addition to that required above, the WEMP will holistically guide the management and maintenance of:

- Noxious weeds listed under the NW Act for the Camden Local Government Area (LGA)
- National Environmental Alert Weeds and Weed of National Significance (WoNS) listed under the National Weeds Strategy 2007 (NWS), by
 - identifying noxious and environmental weeds onsite
 - documenting the area and degree of weed infestations within the site
 - identifying control methods for each weed type
 - identifying ongoing management and monitoring processes to reduce the potential for weeds to be introduced or re-introduced to the site or transported from the site
 - identifying ongoing management processes to control weeds if introduction or re-introduction occurs.

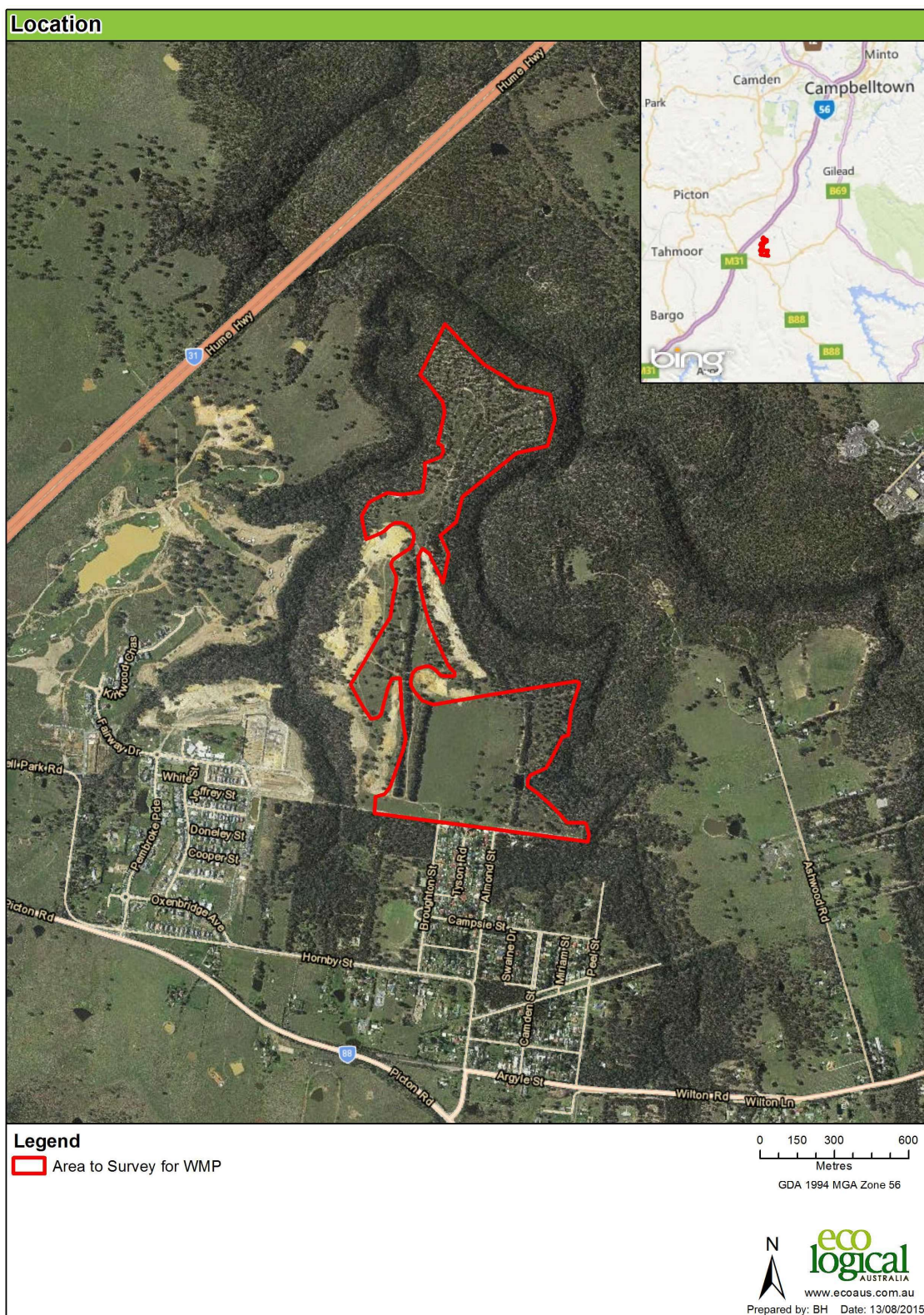


Figure 1 : Location of site



Figure 2 : Management zones

1.3 Legislation

The following legislation is relevant to this WEMP.

1.3.1 Noxious Weeds Act 1993

Noxious Weeds Act 1993 (NW Act) lists noxious weeds that have the potential to cause adverse impacts on the economy, human health and environment of any area. Noxious weeds are required by law under the NW Act to be controlled by all landholders, with the level of control required dictated by the Class of weed present. Noxious Weeds are grouped into one of five classes depending on species distribution and threat posed to primary production, the environment and individuals. Noxious weeds are listed for individual Local Government Areas (LGAs) and are considered to be weeds that reduce the diversity and/or abundance of native species or adversely affect the function of natural ecosystems. Noxious weeds can be introduced or native species to the area that form dense stands that shade and smother endemic species or alter natural disturbance regimes such as fire frequency, which changes the structure and diversity of vegetation communities.

1.3.2 National Weeds Strategy 2007

A number of weeds are identified as National Environmental Alert Weeds under the National Weeds Strategy 2007. There are 28 species listed as environmental weeds. Environmental weeds are those in the early stages of establishment and have the potential to become a serious threat to biodiversity if not adequately managed. The goals of the National Weed Strategy are to prevent new weed problems, reduce the impact of existing weed problems and to enhance Australia's capacity and commitment to solve weed problems.

The National Weeds Strategy also identifies 40 introduced plant species that have been acknowledged as Weeds of National Significance (WoNS). WoNS are listed based on a species ability to pose threats to human health and safety, infrastructure, pastoral and cropping industries, forestry management, biodiversity and cultural values.

2 Description of the environment

2.1 Site location and description

The subject site is located at Wilton, south-west of Sydney within the Bingara Gorge Development area, within the Wollondilly Council LGA. The site contains no existing watercourses, with the exception of a farm dam located in the south-western corner of the subject site.

The subject site has been previously cleared and was slashed prior to site survey for ease of management. Detailed descriptions for each management zone, Greenbridge East, Golf Town and Bushland, are found in **Section 2.2**.

Much of the surrounding area consists of pristine bushland with the exception of a partly completed golf course, primarily adjacent to Golf Town. A relatively small residential area/urban interface is located at the southern end of the subject site, as shown in **Figure 2**.

2.2 Existing environment

2.2.1 Greenbridge East

Greenbridge East is comprised of two distinct areas, improved pasture and under scrubbed and slashed bushland.

The improved pasture area is located in the west of this management zone and contains little remnant native vegetation due to previous land clearance and agricultural land uses. The only native vegetation present is restricted to an avenue of trees along the north-south access road in the west. The under-scrubbed native vegetation area is located in the east of this management zone and is dominated by native shrubs and grasses such as *Themeda australis* (Kangaroo Grass).

Given the history of disturbance and land use at the site, the subject site is dominated by pasture grasses including *Cynodon dactylon* (Couch Grass), *Pennisetum clandestinum* (Kikuyu), *Paspalum dilatatum* (Paspalum), and *Sida rhombifolia* (Paddy's Lucerne). Other weeds recorded in lower densities include *Andropogon virginicus* (Whiskey grass) *Gnaphalium* spp. (Cudweed), *Plantago lanceolata* (Lambs Tongue) and *Sida rhombifolia* (Paddy's Lucerne). A complete list of recorded weed species is found in **Appendix A**.

Several noxious weeds such as *Rubus fruticosus* (Blackberry), *Senecio madagascariensis* (Fireweed), *Asparagus asparagoides* (Bridal Creeper), *Nassella trichotoma* (Serrated Tussock Grass) and *Lycium ferocissimum* (African Boxthorn) were recorded. *Marrubium vulgare* (Horehound) was recorded in very low densities. Whilst this exotic species is not declared noxious in Wollondilly Council LGA, it is declared noxious and known to be invasive in other parts of NSW. Finally, Wollondilly Council's DA conditions identify that the noxious species *Hypericum perforatum* (St John's Wort) has been previously found on-site. None was recorded during this site survey, however, control measures to manage this species will be included in this WEMP. A complete list of recorded noxious weeds is found in **Table 1**, with the declared weeds for Wollondilly Council provided in **Appendix B**.

Five WoNS were recorded within the subject site, African Box Thorn, Blackberry, Bridal Creeper Fireweed and Serrated Tussock Grass.

Weed abundance within this management zone is estimated at approximately 50% cover, with higher densities in the west of the zone. The location of significant weeds is shown in **Figure 3**.

2.2.2 Golf Town

This management zone primarily consists of a scattering of native canopy trees and slashed native shrubs and grasslands, and has a relatively low representation of exotic weed species. Environmental weed species encountered included *Andropogon virginicus* (Whiskey grass) and *Sida rhombifolia* (Paddy's Lucerne). A complete list of recorded weed species is found in **Appendix A**.

Noxious and WoNS species such as *Senecio madagascariensis* (Fireweed), *Asparagus asparagoides* (Bridal Creeper), *Nassella trichotoma* (Serrated Tussock Grass) were recorded within this management zone. A complete list of recorded noxious weeds can be found in **Table 1**, with the declared weeds for Wollondilly Council provided in **Appendix B**.

Weed abundance within this management zone is estimated at approximately 10% cover, with the location of significant weeds shown in **Figure 3**.

2.2.3 Bushland

This management zone was primarily weed free with only a limited representation of environmental weed species encountered within the zone. Environmental weed species encountered included *Andropogon virginicus* (Whiskey grass) and *Axonopus compressus* (Carpet grass). A complete list of recorded weed species is found in **Appendix A**.

There were no recorded Noxious weeds or WoNS with the zone. A complete list of Noxious Weeds declared for the Wollondilly Council Area is provided in **Appendix B**.

Weed abundance within this management zone is estimated at approximately <5% cover.

Table 1 : Noxious weeds locations and severity of infestations

Botanical name	Common name	Class	Location	Degree of infestation	Control requirement	Wons
<i>Asparagus asparagoides</i>	Bridal Creeper	4	Greenbridge East	Low	The plant must not be sold, propagated or knowingly distributed	Yes
<i>Lycium ferocissimum</i>	African Boxthorn	4	Greenbridge East	Low	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed	Yes
<i>Rubus fruticosus</i> agg. Species	Blackberry	4	Greenbridge East	Low	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed	Yes
<i>Senecio madagascariensis</i>	Fireweed	3	Greenbridge East, Golf Town	Low	The plant must not be sold, propagated or knowingly distributed	Yes
<i>Nassella trichotoma</i>	Serrated Tussock Grass	4	Greenbridge East, Golf Town	Low	The plant must not be sold, propagated or knowingly distributed	Yes

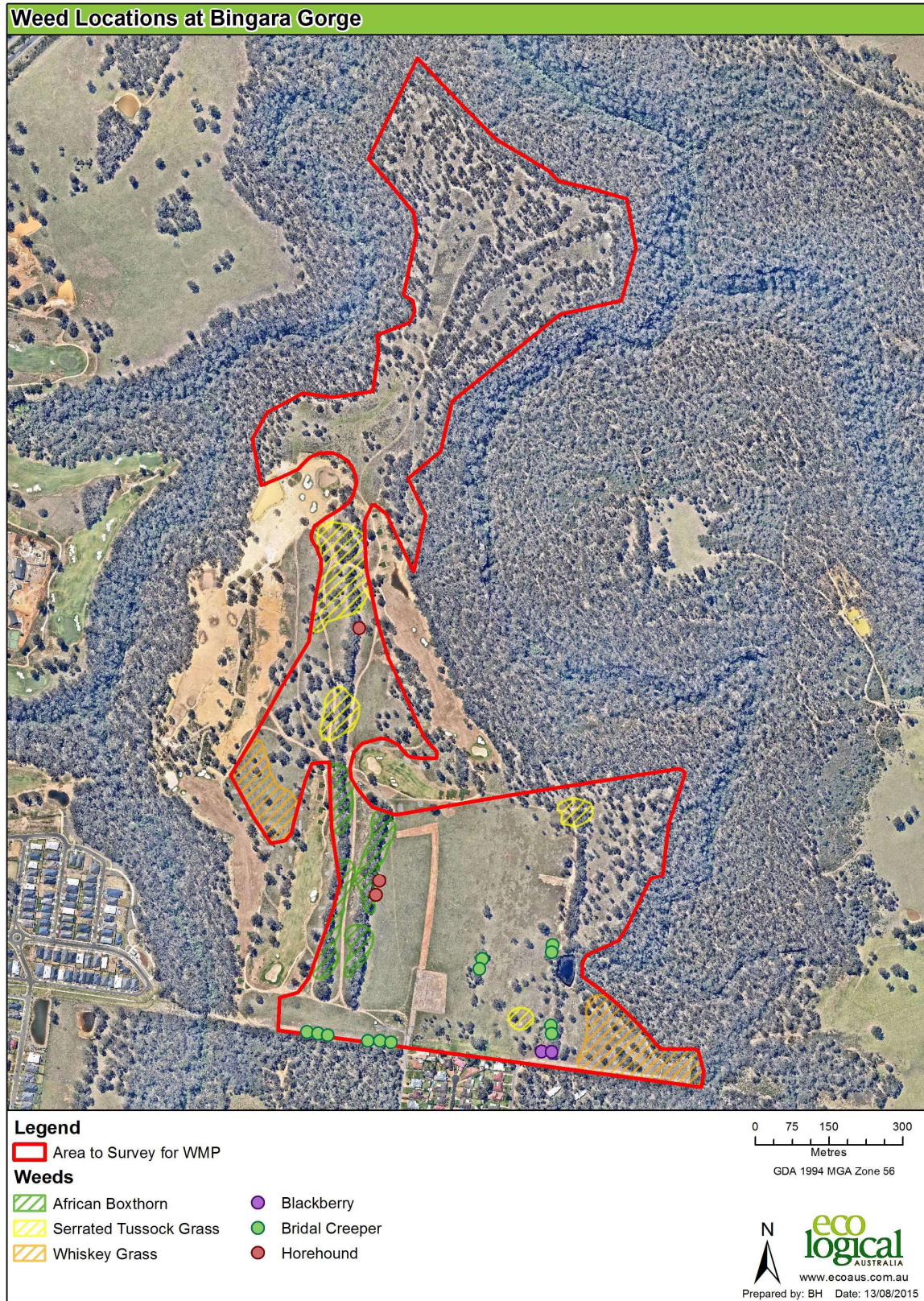


Figure 3 : Weed locations

3 Management

3.1 Weed management

Weed management within the subject site will need to be undertaken prior to construction for the period of approximately 6 – 12 months. This will need to be undertaken by a suitably qualified person holding a minimum qualification of TAFE Cert II in Conservation & Land Management. In addition to this, team leaders should have, as a minimum, a Certificate III in Conservation & Land Management or equivalent and an AQF 3 Chemical users certificate. All herbicides are to be used as per the Australian Pesticides and Veterinary Medicines Authority (APVMA) approved chemical label and at the associated dilution and application rates.

Noxious weeds on site are required to be controlled as per their management class requirements under the NW Act. If noxious weeds appear on site in the future, or if weeds present on site not currently listed as noxious become a declared noxious species for Wollondilly LGA, they will need to be managed in accordance with their management class. Refer to **Appendix B** for a complete list of weed species declared within the Wollondilly Council LGA, noxious weed class and legal requirements for each species.

As part of the proposal, the development area will be cleared and bulk earth works undertaken to prepare the land for development. This will include removing the topsoil and stockpiling on site. As such weed control is focused on processes to reduce the likelihood of transport of weeds to and from the site on vehicles and in soil. This has been broken up into three stages, prior, during and after civil works as shown in **Table 2**. These controls will need to be implemented in addition to the ongoing management processes outlined in **Section 3.2**, below.

Additional species-specific treatment methods are provided as **Appendix A**.

Table 2 : Weed management

Stage	Management Action
Prior to civil works	Given the seasonal nature of weed germination and growth, and the potential delay between approval and implementation of this plan, it is recommended that a qualified ecologist or bush regenerator be onsite immediately prior to any vegetation clearance or weed eradication to identify any additional significant weeds on site and provide recommendations for management.
	Control of woody weeds should be undertaken via the 'cut and paint' method.
	Control of pasture grasses should be undertaken through repeated slashing with machinery.
	Control of woody weed regrowth, noxious or significant environmental weeds (e.g. WoNS) should be undertaken by herbicide spraying.
	Weed control must be started well before civil works to allow for repeated treatments to exhaust the seed bank.
	Vegetative material generated and weed propagules, including from woody weeds, should be disposed of appropriately offsite.
	Woody weed material can be mulched and remain on-site, stockpiled separately from native mulch.

Stage	Management Action
During civil works	Machinery is to be washed down before entering and leaving the site. Wash down areas are to be inspected periodically to control any potential weeds prior to flower or seed production.
	Mitigation measures, including erosion control, should be put in place to prevent the movement of weed seeds.
	Topsoil should be removed as part of earthworks only where there is minimal weed invasion. If significant weeds are present then management of weeds as per above must be undertaken. Topsoil may be stockpiled on-site.
	All stockpiles must be located > 50 m from riparian land and areas of native vegetation.
	Any fill used on-site must be 'clean' fill free of weed propagules. The site supplying the fill (either onsite or off site) is to be inspected prior to the transportation of any fill material. This includes the inspection of any topsoil on site that is to be stockpiled. If invasive weeds are present within the fill material, the weeds are to be treated prior to fill transportation. Treatment must take into consideration the likelihood of seed being present in the soil and include measures to reduce the potential for transported seed to germinate (e.g. through stockpiling time or through the use of pre-emergent herbicides). The inspection is to be undertaken by a qualified and experienced person holding a minimum qualification of TAFE Cert III in CLM. Written certification that the fill is 'clean' from weeds is required prior to transportation.
	The area receiving fill, including stockpiles, must have sediment fences installed around the perimeter of the fill placement areas.
	Monitoring of fill, including stockpiles will be required fortnightly for a period of three months after fill has been transported. The frequency of the monitoring is designed to reduce the potential for weeds to reproduce and re-establish. A brief report is to be submitted following each site visit outlining the date of the inspection, weeds observed and treatment action required. Monitoring is to be undertaken by a suitably qualified and experienced person holding a minimum qualification of TAFE Cert III in CLM.
After civil works	Engage a qualified ecologist or bush regenerator holding a minimum qualification of TAFE Cert III in CLM to undertake regular maintenance inspections to ensure weeds do not re-establish and set seed. If weeds are recorded on site they must be treated within five days.
	Undertake ongoing management of the site, as specified in Section 4 , until lot ownership is transferred.

3.2 Annual weed management program

An annual weed management program will be required during all stages of the civil works, especially in the peak growing seasons. The frequency of maintenance required will depend on the persistence of exotic species and seasonal changes (e.g. less frequent in the cooler months). It is expected that maintenance works following will be required at least bi-monthly during the peak growing seasons and quarterly in the cooler periods.

Ongoing management that are required include:

- Treatment of any regrowth from primary treated weed species

- Control of subsequent growth of other weed species
- Reduction of the potential for the spread of weeds to and from the site.

These will need to be implemented through all stages of the civil works. These processes include but are not limited to the following:

- Any weeds recorded on site are to be treated in an appropriate manner within five days of their presence been reported. It is recommended that Lend Lease Communities Pty Ltd establish an agreement with a suitable service provider to provide responses within these timeframes.
- Sediment basins, dams or water features (Golf Course) within the site are monitored for weed occurrence monthly (including aquatic weeds). Any weeds are to be eradicated in an appropriate manner within five days of their presence been reported.
- Any herbicide spraying in proximity to waterways is to only use herbicides formulated for this purpose (e.g. Roundup® Bioactive™) and is to be conducted with care to avoid unnecessary damage to native species.
- Where noxious weed material and soil contaminated with weed material is found onsite, it will be removed from the site in sealed plastic bags and disposed of offsite and taken to an appropriately licensed waste disposal facility.
- Regular (at minimum monthly) surveys and treatment of disturbed edges (pathways and access roads) and urban interfaces.

4 Specifications / standards

Weed control involves a combination of mechanical, physical and chemical techniques to remove the weeds and prevent regrowth. A selection of the best suited weed control method within the site depends on a number of factors including:

1. the species or combination of weeds being targeted
2. the density of the weeds
3. resources available (time, labour, equipment and finances)
4. weather conditions of the day

Detail of specific weed control techniques to be used such as cut and paint, scrape and paint, herbicide spraying and hand weeding are given in Brodie (1999). The principles of bush regeneration and techniques to trigger natural regeneration are to be in accordance with the Bradley Method and other techniques described in Buchanan (2000). Management techniques for different types of weeds are provided in **Appendix C**.

4.1.1 Annual grasses

Annual grasses should be slashed/brush cut in late spring to early summer, after flowering, but prior to seed set. For most species, slashing/brush cutting prior to late spring through to early summer will promote vigorous growth and should not occur. However, some annual grasses can grow and produce seed at any time of the year dependent on climatic conditions such as high rainfall and warm temperatures. Monitoring of annual species should be undertaken and if new growth occurs, the same treatment will be applied to the new growth to prevent seed production. Individual plants should be hand removed, bagged and disposed of appropriately offsite.

4.1.2 Perennial grasses

Perennial grasses, such as *Paspalum dilatatum* (Paspalum) and *Pennisetum clandestinum* (Kikuyu Grass) should be slashed prior to seed production in spring or summer (depending on the growth cycle of the species) and the regrowth spot-sprayed 2-3 weeks later when it is actively growing and approximately 10 cm in length. Monitoring of these species will occur and if new seed production occurs, the same treatment will be applied again as required. It should be noted that, slashing will not reduce the presence of exotic grasses on its own and in this circumstances is being used to control seed production before topsoil removal.

Serrated Tussock Grass requires an integrated management to ensure suitable control and containment. Refer **Section 4.1.6** for additional management actions.

4.1.3 Woody weeds

Woody weeds including *Lycium ferocissimum* (African Boxthorn) will be controlled initially by cut and paint method. All seedlings of woody weeds will be spot-sprayed with a non-selective herbicide.

4.1.4 Creepers and climbers

The control of creepers, including *Asparagus asparagoides* (Bridal Creeper) and *Rubus fruticosus* agg. spp. (Blackberry) varies depending on the species. For the most part, seedlings will be hand pulled, while mature plants can be controlled by the stem-scrape method or spot spraying using a non-selective herbicide. The precise method to be used will be determined by the bush regeneration contractor.

depending on the species, size and reproductive status of the individual. All vegetative material removed should be bagged, removed from site and disposed of appropriately.

4.1.5 Herbaceous weeds

Where herbaceous weeds, including *Conyza bonariensis* (Flax-leaf Fleabane) and, are found, they will be sprayed using a non-selective herbicide where applicable. If high densities of mature stands occur, weeds may be slashed first using a brush cutter and any subsequent regrowth sprayed. Regular monitoring of these species will be required to prevent seed production. *Cirsium vulgare* (Spear Thistle) will not be hand-pulled due to its thorns and instead will be spot sprayed using a non-selective herbicide. All vegetative material that is pulled out and has the potential to regrow if deposited on ground will be bagged and removed from site.

St John's Wort requires an integrated management to ensure suitable control and containment. Refer **Section 4.1.6** for additional management actions.

4.1.6 Additional weed management actions

As a requirement of Wollondilly Council, additional measures are required to contain and manage *Nassella trichotoma* (Serrated Tussock Grass) and *Hypericum perforatum* (St John Wort). **Table 3** outlines these actions. In additional control methods are provide as **Appendix A**.

Table 3 : Additional management items Serrated Tussock and St John's Wort

Item	Activities	Task	Frequency	By whom
Monitoring and early intervention	Site inspection and survey	Map all known populations and key areas	Monthly	Field Ecologist / Bush Regeneration contractor
	Establish 'no go' zones or flagged areas to limited on-site seed distribution	Exclusion fencing in place	ongoing	Field Ecologist / Bush Regeneration contractor
	Educational program	Identification literature provided to staff	ongoing	Field Ecologist
	Inspection of plant and wash down bays	Pre and post use inspections of plant for seeds and soil	Daily	Grounds staff/ Civil contractor
Integrated weed management program	Non-chemical weed control	Manual removal of small and isolated specimens	ongoing	Bush Regeneration contractor
		Grass cutting and slashing equipment excluded from 'no go' zones	ongoing	Grounds staff/ Civil contractor
	Chemical control	A variety of registered herbicides used in coordination with other methods to reduce incidence of herbicide resistance	ongoing	Bush Regeneration contractor
	Biological control	Establishment of biological controls within the subject site		Make contact LCA noxious weeds officer of NSW DPI

4.2 Management of weed waste

All exotic vegetation material should be removed from site and composted at a registered green waste disposal facility. Fruiting parts and tubers should be bagged before being removed from site.

4.3 Herbicide use

Herbicide use should occur during the active growing season for plants to encourage the chemical uptake into the plant. The selection of herbicides should also consider the type of weed and the location. Where non-selective herbicides are required for use, glyphosate is the most suitable. If herbicides are required to be used near waterways, a glyphosate-based herbicide formulated for use near waterways will be used (e.g. RoundUp® Biactive™).

Broad-leaf selective herbicide may be used as per the *Noxious and environmental weed control handbook* (DPI 2010). However, this type of herbicide is extremely toxic to aquatic life and must not be used in, or adjacent to, waterways. Registration and records must be kept in accordance with the NSW *Pesticide Regulation 2009*.

All chemicals are to be applied as specified as per chemical label or Off label permit No. 9907

4.4 Bush regeneration/weed control contractors

All vegetation management works will be undertaken by suitably qualified and experienced bush regeneration contractors who are members of the Australian Association of Bush Regenerators or fulfil the membership criteria. In addition to this, team leaders should have, as a minimum, a Certificate III in CLM or equivalent and a current AQF 3 Chemicals users certificate. A flexible approach to this site is recommended since techniques may need to be changed or modified to suit site conditions. This approach is consistent with adaptive management and allows the contractor to develop and build on site knowledge whilst implementing this WEMP.

5 Monitoring and reporting

Monitoring and reporting, is extremely important. The bush regeneration contractor and the lead supervisor will monitor the vegetation for changes over time. Information gained through the monitoring and reporting process will identify works that have and have not been successful, and the reasons for their success or failure.

The objective of the monitoring and reporting program is to record changes to the vegetation as a result of weed management works. Monitoring works will require liaison with Wollondilly Council.

5.1 Monitoring reports

Reporting will be required at the completion of each stage (prior to, during and after civil works) and on a monthly basis, continuing until signed off at the practical completion of civil works.

Monthly site walkovers will be required to monitor the progress. A brief report will be prepared outlining compliance with weed management processes and reporting on the performance criteria. Site conditions should be recorded on the work plan template at the beginning and end of on-ground works. Monitoring photo points should be set-up using a permanent reference point. In addition, the report should include:

- works carried out, including weed species targeted and their location
- an approximation of the time spent on each task
- any observations, such as the occurrence of new weed species
- rates of regeneration or other issues (e.g. records of threatened species)
- a description of any problems encountered and how they were overcome
- a summary of how the site-specific objectives have been met (or not)
- herbicide and other chemicals used, including quantity, dilution rate and other relevant information
- other weed control mechanisms (e.g. mechanical control) used during the period
- climatic conditions which influenced weed germination
- performance criteria and success
- if required, maps of weed distribution and density

5.2 Performance criteria

The progress and compliance with the WEMP will be monitored and reviewed monthly. This process will involve the contractor(s), the lead supervisor and Wollondilly Council. If required, reporting will be followed by a site visit to discuss issues of concern. Management and monitoring of the site will occur in three main stages; prior to, during and after civil works are completed. Monitoring is to be undertaken by a person holding a minimum qualification of TAFE Cert III in Conservation & Land Management.

The performance criteria are outlined in **Table 4**, to be achieved by the end of the period identified (e.g. 'Prior to civil works'. Where non-performance occurs and is not immediately rectified, a noxious weed control order under Section 18 of the Noxious Weed Act 1998 will be issued by Wollondilly Council.

Table 4: Performance criteria

Stage	Criteria
Prior to civil works	All significant weeds identified on-site by a qualified ecologist or bush regenerator prior to any vegetation clearance or weed eradication.
	Commencement of all tasks outlined in the WEMP or evidence of planning for their implementation.
	No woody weeds present on-site
	Evidence of seed suppression of pasture grasses through multiple treatments
	No noxious weeds present on-site
	Exotic material appropriately disposed off-site
	Machinery washed down before and after entering site
	Soil and water management actions implemented.
	Proportion of exotic groundcover no greater than 20% cover
During civil works	Fill used on site is 'clean'
	Development area including stockpiles and sediment basins monitored for weeds
	Weeds recorded on site are eradicated within 5 days
	Machinery washed down before and after entering site
	Soil and water management actions implemented
	Proportion of exotic groundcover no greater than 10% cover
After civil works	Development area including stockpiles and sediment basins monitored for weeds
	Weeds recorded on site are eradicated within five days
	Machinery washed down before and after entering site
	Soil and water management actions implemented
	Proportion of exotic groundcover no greater than 5% cover

References

Brodie, L. 1999. *The National Trust Bush Regenerators Handbook*. National Trust of Australia (NSW)

Buchanan, R.A. 2000. *Bush regeneration: recovering Australian landscapes*. 2nd ed, TAFE NSW, Sydney

Department of Primary Industries (DPI) 2015. Weed Wise St John Wort (Online Resource: <http://weeds.dpi.nsw.gov.au/Weeds/Details/135> Accessed 12 August 2015)

Department of Primary Industries (DPI) 2015 *Noxious and environmental weed control handbook –A guide to weed control in non-crop, aquatic and bushland situations 6th Edition*, Published by the Department of Primary Industries,

Muyt, A. 2001 *Bush Invaders of South-East Australia*. R.G. and F.J. Richardson Publishers, Meredith, Victoria

Appendix A: Weed species list and treatment table

Family	Scientific name	Common name	Status	Location in subject site	Degree of infestation	Primary treatment (70% kill)	TIMING	Secondary treatment (90% kill)	Ongoing management
Apocynaceae	<i>Araujia sericifera</i>	Moth Vine	Environmental weed	Greenbridge East	Low	Hand Removal or 'scape and paint' with 'neat' Glyphosate 360 g/L	All year	Spot spray with Glyphosate 360 g/L at a rate of 1:100 with the addition of a surfactant (i.e. Pulse) to the rate of 1 L: 200L of water	Seeds are extremely viable. Regular monitoring required to manage seedlings
	<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush	Environmental weed	Greenbridge East	Low	Hand Removal or 'cut and paint' with with 'neat' Glyphosate 360 g/L	All year	Spot spray with Glyphosate based herbicide (360 g/L) at a rate of of 1L :100L of water	
Asparagaceae	<i>Asparagus asparagoides</i>	Bridal Creeper	Noxious weed, Wons	Greenbridge East	Low	Manual removal of underground tubers with biomass taken from site Or application of a METSULFURO N METHYL based herbicide applied at 10g: 100L	August to September	Spot spray seedlings Or hand remove with biomass taken from site.	Plant is dormant over the Summer period. Spraying during its flowering period increases effective. Rates taken from APVMA off label permit 9907.

Family	Scientific name	Common name	Status	Location in subject site	Degree of infestation	Primary treatment (70% kill)	TIMING	Secondary treatment (90% kill)	Ongoing management
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	Environmental weed	Greenbridge East, Golf Town	Low	Hand removal Or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year prior to flowering.	Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Disturbance during removal can distribute seed and promote additional germination.
	<i>Hypochaeris radicata</i>	Catsear	Environmental weed	Greenbridge East, Golf Town	Low	Hand removal Or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year	Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Treatment prior to seed set. A regular slashing will limit its further spread on site.
	<i>Senecio madagascariensis</i>	Fireweed	Noxious weed, Wons	Greenbridge East, Golf Town	Low	Manual removal Or spot spraying application of a METSULFURO N METHYL based herbicide applied at 10g: 100L	All year	Manual removal Or application of a METSULFURO N METHYL based herbicide applied at 10g: 100L	Regular monitoring to manage seedlings. Gloves to be worn during removal. Periodically slashing of pastoral areas
	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	Environmental weed	Greenbridge East, Golf Town	Low	Hand removal Or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year	Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Regular monitoring to manage seedlings.

Family	Scientific name	Common name	Status	Location in subject site	Degree of infestation	Primary treatment (70% kill)	TIMING	Secondary treatment (90% kill)	Ongoing management
	<i>Gnaphalium spp</i>	Cud weed	Environmental weed	Greenbridge East, Golf Town	Low	Hand removal Or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year	Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	
	<i>Sonchus oleraceus</i>	Common Sowthistle	Environmental weed	Greenbridge East, Golf Town	Low	Hand removal Or spot spray with a Glyphosate based herbicide ((360 g/L) applied at a rate of 1L :100L of water	All year	Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Treatment prior to seed set. A regular slashing will limit its further spread on site.
Lamiaceae	<i>Marrubium vulgare</i>	Horehound	Agricultural/ Environmental weed	Greenbridge East, Golf Town	Low	Hand removal Or Spot spray with triclopyr + picloram based herbicide (300 g/l + 100 g/l) at 350ml : 100L water	All year, primarily during summer and Autumn prior to flowering	Hand removal Or Spot spray with triclopyr + picloram based herbicide (300 g/l + 100 g/l) at 350ml : 100L water	
Malvaceae	<i>Modiola caroliniana</i>	Red-flowered Mallow	Environmental weed	Greenbridge East,	Low	Hand removal Or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year	Hand removal Or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	

Family	Scientific name	Common name	Status	Location in subject site	Degree of infestation	Primary treatment (70% kill)	TIMING	Secondary treatment (90% kill)	Ongoing management
	<i>Pavonia hastata</i>	Pavonia	Environmental weed	Greenbridge East,	Low	Hand Removal or 'cut and paint' with with 'neat' Glyphosate 360 g/L	All year	Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	
	<i>Sida rhombifolia</i>	Paddy's Lucerne	Environmental weed	Greenbridge East, Golf Town	Low	Hand removal <u>Or</u> spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year.	Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Avoid herbicide application on frost or heat stressed plants.
Poaceae	<i>Andropogon virginicus</i>	Whiskey Grass	Environmental weed	Greenbridge East, Golf Town, Bushland	Low :Bushland - Medium : Greenbridge East, Golf Town	Hand remove <u>Or</u> spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water. Target may require slashing to stimulate new growth and remove dead foliage.	All year, best results achieved on actively growing plants.	Hand remove <u>Or</u> Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Regular slashing of known populations will reduce flowering and seed set

Family	Scientific name	Common name	Status	Location in subject site	Degree of infestation	Primary treatment (70% kill)	TIMING	Secondary treatment (90% kill)	Ongoing management
	<i>Axonopus compressus</i>	Carpet Grass	Pasture Grass	Greenbridge East, Bushland	Medium : Greenbridge East, Low : Bushland	Spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year, best results achieved on actively growing plants.	Hand remove <u>Or</u> Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Bulk of plant is within develop-ent foot print. Best action would be to remaining slashing to reduce seed set.
	<i>Chloris gayana</i>	Rhodes Grass	Environmental weed	Greenbridge East, Golf Town	Low	Hand removal <u>Or</u> spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year, best results achieved on actively growing plants	Hand remove <u>Or</u> Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Treatment prior to seed set. A regular slashing will limit its further spread on site.
	<i>Cynodon dactylon</i>	Common Couch	Pasture Grass	Greenbridge East, Golf Town,	Low : Golf Town. Medium : Greenbridge East	Spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water. Target may require slashing to stimulate new growth and remove dead foilage.	All year, best results achieved on actively growing plants.	Spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water.	Bulk of plant is within developemet foot print. Best action would be to remaining slashing and retaining to act as a weed surpressant.

Family	Scientific name	Common name	Status	Location in subject site	Degree of infestation	Primary treatment (70% kill)	TIMING	Secondary treatment (90% kill)	Ongoing management
	<i>Ehrharta erecta</i>	Panic Veldtgrass	Environmental weed	Greenbridge East, Golf Town	Low	Hand removal Or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year	Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	
	<i>Eragrostis curvula</i>	African Lovegrass	Environmental weed	Greenbridge East, Golf Town	Low	spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1 L per 100L of water Or Flupropanate based herbicide 300 mL : 100L water	All year, best results achieved on actively growing plants	Hand remove Or Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Treatment prior to seed set. A regular slashing will limit its further spread on site.
	<i>Nassella trichotoma</i>	Serrated tussock	Noxious weed/Wons	Greenbridge East, Golf Town,	Low	Spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water Or Flupropanate based herbicide (745 g/l) 200mL : 10L of water	All year, best results achieved on actively growing plants.	Spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water Or Flupropanate based herbicide (745 g/l) 200mL : 10L of water	Plant occurs on site in disturbed areas and adjacent to tracks. Regular monitoring required to manage seedlings

Family	Scientific name	Common name	Status	Location in subject site	Degree of infestation	Primary treatment (70% kill)	TIMING	Secondary treatment (90% kill)	Ongoing management
	<i>Paspalum dilatatum</i>	Paspalum	Environmental weed	Greenbridge East, Golf Town	Low	Hand removal <u>Or</u> spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year, best results achieved on actively growing plants. Larger specimens may require slashing to promote new growth prior to spraying	Hand removal <u>Or</u> spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	
	<i>Pennisetum clandestinum</i>	Kikuyu	Pasture Grass	Greenbridge East	High	Boom or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year, best results achieved on actively growing plants. Slashing and stimulating regrowth prior to spraying will increase kill rate	Hand remove <u>Or</u> Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Bulk of plant is within development foot print. Best action would be to remaining slashing and retaining to act as a weed suppressant.

Family	Scientific name	Common name	Status	Location in subject site	Degree of infestation	Primary treatment (70% kill)	TIMING	Secondary treatment (90% kill)	Ongoing management
	<i>Setaria parviflora</i>	Slender Pigeon Grass	Environmental weed	Greenbridge East, Golf Town	Low	Spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year, best results achieved on actively growing plants.	Hand remove <u>Or</u> Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	
	<i>Sporobolus africanus</i>	Parramatta Grass	Environmental weed	Greenbridge East, Golf Town	Low	Spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year	Hand remove <u>Or</u> Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	
	<i>Stenotaphrum secundatum</i>	Buffalo Grass	Pasture Grass	Greenbridge East	Low	Boom or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year, best results achieved on actively growing plants. Slashing and stimulating regrowth prior to spraying will increase kill rate	Hand remove <u>Or</u> Spot spray seedlings with Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Bulk of plant is within development foot print. Best action would be to remaining slashing and retaining to act as a weed suppressant.

Family	Scientific name	Common name	Status	Location in subject site	Degree of infestation	Primary treatment (70% kill)	TIMING	Secondary treatment (90% kill)	Ongoing management
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues	Environmental weed	Greenbridge East, Golf Town,	Low	Spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water.	All year	Spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water.	
Rosaceae	<i>Rubus fruticosus</i> agg. Species	Blackberry	Noxious Weed	Greenbridge East	Low	Spot spray metsulfuron methyl (600 g/kg) based herbicide at a rate of 10g : 100L of water	Best results achieved on actively growing and flowering plants.	Spot spray metsulfuron methyl (600 g/kg) based herbicide at a rate of 10g : 100L of water	
Solanaceae	<i>Lycium ferocissimum</i>	African Boxthorn	Noxious Weed	Greenbridge East	Low	Cut and paint with with with 'neat' Glyphosate 360 g/L	All year	Spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water.	
	<i>Solanum pseudocapsicum</i>	Jerusalem Cherry	Environmental weed	Greenbridge East, Golf Town,	Low	Hand removal Or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year	Hand removal Or spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	

Family	Scientific name	Common name	Status	Location in subject site	Degree of infestation	Primary treatment (70% kill)	TIMING	Secondary treatment (90% kill)	Ongoing management
Urticaceae	<i>Urtica urens</i>	Small Nettle	Environmental weed	Greenbridge East	Low	Hand removal <u>Or</u> spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	All year	Hand removal <u>Or</u> spot spray with a Glyphosate based herbicide (360 g/L) applied at a rate of 1L :100L of water	Rates taken from APVMA off label permit 9907.

Appendix B: Noxious weed declarations for Wollondilly Council

The following weeds are declared noxious in the control area of Wollondilly Council:

Common Name	Botanical name	Class	Legal Requirements
African boxthorn	<i>Lycium ferocissimum</i>	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
African feather grass	<i>Pennisetum macrourum</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with
African olive	<i>Olea europaea</i> subsp. <i>cuspidata</i>	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
African turnip weed - eastern	<i>Sisymbrium thellungii</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with
African turnip weed - western	<i>Sisymbrium runcinatum</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with
Alligator weed	<i>Alternanthera philoxeroides</i>	3	The plant must be fully and continuously suppressed and destroyed
Anchored water hyacinth	<i>Eichhornia azurea</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Annual ragweed	<i>Ambrosia artemisiifolia</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with
Arrowhead	<i>Sagittaria montevidensis</i>	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
Artichoke thistle	<i>Cynara cardunculus</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with
Asparagus - asparagus fern	<i>Asparagus virgatus</i>	2	The plant must be eradicated from the land and that land must be kept free of the plant
Asparagus - climbing asparagus	<i>Asparagus africanus</i>	2	The plant must be eradicated from the land and that land must be kept free of the plant
Asparagus - climbing asparagus fern	<i>Asparagus plumosus</i>	4	The plant must not be sold, propagated or knowingly distributed

Common Name	Botanical name	Class	Legal Requirements
Asparagus - ground asparagus	<i>Asparagus aethiopicus</i>	4	The plant must not be sold, propagated or knowingly distributed
Asparagus - ming asparagus fern	<i>Asparagus macowanii</i> var. <i>zuluensis</i>	2	The plant must be eradicated from the land and that land must be kept free of the plant
Asparagus - sicklethorn	<i>Asparagus falcatus</i>	2	The plant must be eradicated from the land and that land must be kept free of the plant
Asparagus weeds	<i>Asparagus</i> species	4	The plant must not be sold, propagated or knowingly distributed
Athel pine	<i>Tamarix aphylla</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with
Balloon vine	<i>Cardiospermum grandiflorum</i>	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
Bear-skin fescue	<i>Festuca gautieri</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with
Bitou bush	<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i>	2	The plant must be eradicated from the land and that land must be kept free of the plant
Black knapweed	<i>Centaurea nigra</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Black willow	<i>Salix nigra</i>	2	The plant must be eradicated from the land and that land must be kept free of the plant
Blackberry	<i>Rubus fruticosus</i> species aggregate	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
Boneseed	<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Bridal creeper	<i>Asparagus asparagoides</i>	4	The plant must not be sold, propagated or knowingly distributed
Bridal veil creeper	<i>Asparagus declinatus</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Broad-leaf pepper tree	<i>Schinus terebinthifolius</i>	2	The plant must be eradicated from the land and that land must be kept free of the plant
Broomrapes	<i>Orobanche</i> species	1	The plant must be eradicated from the land and that

Common Name	Botanical name	Class	Legal Requirements
			<i>land must be kept free of the plant</i>
Burr - Bathurst burr	<i>Xanthium spinosum</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</i>
Burr - Californian burr	<i>Xanthium orientale</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</i>
Burr - Italian cockleburr	<i>Xanthium italicum</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</i>
Burr - Noogoora burr	<i>Xanthium occidentale</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</i>
Burr - South American burr	<i>Xanthium cavanillesii</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</i>
Burr ragweed	<i>Ambrosia confertiflora</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Cabomba	<i>Cabomba caroliniana</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Cape broom	<i>Genista monspessulana</i>	3	<i>The plant must be fully and continuously suppressed and destroyed and the plant must not be sold, propagated or knowingly distributed</i>
Cat's claw creeper	<i>Dolichandra unguis-cati</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</i>
Cayenne snakeweed	<i>Stachytarpheta cayennensis</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Chilean needle grass	<i>Nassella neesiana</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Chinese celtis	<i>Celtis sinensis</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Chinese violet	<i>Asystasia gangetica</i> subsp. <i>micrantha</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Clockweed	<i>Gaura parviflora</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a</i>

Common Name	Botanical name	Class	Legal Requirements
			<i>notifiable weed must be complied with</i>
Coolatai grass	<i>Hyparrhenia hirta</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Corn sowthistle	<i>Sonchus arvensis</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Dodder	<i>Cuscuta species</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Espartillo - broad kernel	<i>Amelichloa caudata</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Espartillo - narrow kernel	<i>Amelichloa brachychaeta</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Eurasian water milfoil	<i>Myriophyllum spicatum</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Fine-bristled burr grass	<i>Cenchrus brownii</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Fireweed	<i>Senecio madagascariensis</i>	4	<i>The plant must not be sold, propagated or knowingly distributed</i>
Flax-leaf broom	<i>Genista linifolia</i>	4	<i>The plant must not be sold, propagated or knowingly distributed</i>
Fountain grass	<i>Cenchrus setaceus</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Frogbit	<i>Limnobium laevigatum</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Gallon's curse	<i>Cenchrus biflorus</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Gamba grass	<i>Andropogon gayanus</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Giant Parramatta grass	<i>Sporobolus fertilis</i>	3	<i>The plant must be fully and continuously suppressed and destroyed</i>
Giant reed	<i>Arundo donax</i>	4	<i>The plant must not be sold, propagated or knowingly distributed</i>
Glaucous starthistle	<i>Carthamus leucocaulos</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Golden dodder	<i>Cuscuta campestris</i>	4	<i>The growth of the plant must be managed in a manner</i>

Common Name	Botanical name	Class	Legal Requirements
			<i>that continuously inhibits the ability of the plant to spread</i>
Golden thistle	<i>Scolymus hispanicus</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Gorse	<i>Ulex europaeus</i>	3	<i>The plant must be fully and continuously suppressed and destroyed</i>
Green cestrum	<i>Cestrum parqui</i>	3	<i>The plant must be fully and continuously suppressed and destroyed</i>
Grey willow	<i>Salix cinerea</i>	2	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Groundsel bush	<i>Baccharis halimifolia</i>	3	<i>The plant must be fully and continuously suppressed and destroyed</i>
Harrisia cactus	<i>Harrisia species</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Hawkweeds	<i>Hieracium species</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Honey locust	<i>Gleditsia triacanthos</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Horsetails	<i>Equisetum species</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Hydrocotyl	<i>Hydrocotyl ranunculoides</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Hygrophila	<i>Hygrophila costata</i>	2	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Hymenachne	<i>Hymenachne amplexicaulis</i> and hybrids	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Italian bugloss	<i>Echium italicum</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</i>
Karoo thorn	<i>Acacia karroo</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Kidney-leaf mud plantain	<i>Heteranthera reniformis</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>

Common Name	Botanical name	Class	Legal Requirements
Kochia	<i>Bassia scoparia</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Koster's curse	<i>Clidemia hirta</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Kudzu	<i>Pueraria lobata</i>	3	The plant must be fully and continuously suppressed and destroyed
Lagarosiphon	<i>Lagarosiphon major</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Leafy elodea	<i>Egeria densa</i>	4	The plant must not be sold, propagated or knowingly distributed
Lippia	<i>Phyla canescens</i>	4	The plant must not be sold, propagated or knowingly distributed except incidentally in hay or lucerne
Long-leaf willow primrose	<i>Ludwigia longifolia</i>	3	The plant must be fully and continuously suppressed and destroyed and the plant must not be sold, propagated or knowingly distributed
Ludwigia	<i>Ludwigia peruviana</i>	2	The plant must be eradicated from the land and that land must be kept free of the plant
Madeira vine	<i>Anredera cordifolia</i>	3	The plant must be fully and continuously suppressed and destroyed
Mexican feather grass	<i>Nassella tenuissima</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Mexican poppy	<i>Argemone mexicana</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with
Miconia	<i>Miconia</i> species	1	The plant must be eradicated from the land and that land must be kept free of the plant
Mikania vine	<i>Mikania micrantha</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Mimosa	<i>Mimosa pigra</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Morning glory - purple	<i>Ipomoea indica</i>	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread
Mossman River grass	<i>Cenchrus echinatus</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with
Mother-of-millions	<i>Bryophyllum</i> species	4	The growth of the plant must be managed in a manner

Common Name	Botanical name	Class	Legal Requirements
			<i>that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Mysore thorn	<i>Caesalpinia decapetala</i>	3	<i>The plant must be fully and continuously suppressed and destroyed</i>
Pampas grass	<i>Cortaderia</i> species	3	<i>The plant must be fully and continuously suppressed and destroyed and the plant must not be sold, propagated or knowingly distributed</i>
Paper mulberry	<i>Broussonetia papyrifera</i>	2	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Parthenium weed	<i>Parthenium hysterophorus</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Paterson's curse	<i>Echium plantagineum</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread</i>
Pond apple	<i>Annona glabra</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Prickly acacia	<i>Acacia nilotica</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Prickly pear - common pear	<i>Opuntia stricta</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Prickly pear - Hudson pear	<i>Cylindropuntia rosea</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Prickly pear - smooth tree pear	<i>Opuntia monacantha</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Prickly pear - tiger pear	<i>Opuntia aurantiaca</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Prickly pear - velvety tree pear	<i>Opuntia tomentosa</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Red rice	<i>Oryza rufipogon</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a</i>

Common Name	Botanical name	Class	Legal Requirements
			<i>notifiable weed must be complied with</i>
Rhus tree	<i>Toxicodendron succedaneum</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Rubber vine	<i>Cryptostegia grandiflora</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Sagittaria	<i>Sagittaria platyphylla</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Salvinia	<i>Salvinia molesta</i>	3	<i>The plant must be fully and continuously suppressed and destroyed</i>
Scotch broom	<i>Cytisus scoparius</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>
Senegal tea plant	<i>Gymnocoronis spilanthoides</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Serrated tussock	<i>Nassella trichotoma</i>	3	<i>The plant must be fully and continuously suppressed and destroyed and the plant must not be sold, propagated or knowingly distributed</i>
Siam weed	<i>Chromolaena odorata</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Silverleaf nightshade	<i>Solanum elaeagnifolium</i>	4	<i>The plant must not be sold, propagated or knowingly distributed</i>
Smooth-stemmed turnip	<i>Brassica barrelieri</i> subsp. <i>oxyrrhina</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Soldier thistle	<i>Picnemon acarna</i>	5	<i>The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with</i>
Spongeplant	<i>Limnobia spongia</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
Spotted knapweed	<i>Centaurea stoebe</i> subsp. <i>micranthos</i>	1	<i>The plant must be eradicated from the land and that land must be kept free of the plant</i>
St. John's wort	<i>Hypericum perforatum</i>	4	<i>The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed</i>

Common Name	Botanical name	Class	Legal Requirements
Texas blueweed	<i>Helianthus ciliaris</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with
Tree-of-heaven	<i>Ailanthus altissima</i>	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
Tropical soda apple	<i>Solanum viarum</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Tussock paspalum	<i>Paspalum quadrifarium</i>	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed
Viper's bugloss	<i>Echium vulgare</i>	4	The growth of the plant must be managed in a manner that continuously inhibits the ability of the plant to spread
Water caltrop	<i>Trapa species</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Water hyacinth	<i>Eichhornia crassipes</i>	3	The plant must be fully and continuously suppressed and destroyed
Water lettuce	<i>Pistia stratiotes</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Water soldier	<i>Stratiotes aloides</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Willows	<i>Salix species</i>	4	The plant must not be sold, propagated or knowingly distributed
Witchweeds	<i>Striga species</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Yellow bells	<i>Tecoma stans</i>	3	The plant must be fully and continuously suppressed and destroyed
Yellow burrhead	<i>Limnocharis flava</i>	1	The plant must be eradicated from the land and that land must be kept free of the plant
Yellow nutgrass	<i>Cyperus esculentus</i>	5	The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with

Appendix C: Weed control techniques

Cut and paint

The cut and paint method is suitable for the control of woody weeds, large herbaceous weeds and vines/climbers (**Figure 4**). It is commonly used when the biomass is to be removed from the site following the primary weed control. It is most suitable for plants with a small diameter at the base and a single stem or trunk. The cut and paint method is suitable for the control of species such as Lantana. Where plants have a larger diameter at the base or multiple stems, the drill and fill method may be more efficient, e.g. large Privets.

The plant should be cut as close to the base as possible, below any branches and the cut should be horizontal. The remaining stump should not exceed 10mm in height. The tools required to make the cut may be a handsaw, secateurs or chainsaw. Any dirt on the stump needs to be removed and the herbicide needs to be directly applied to the stump using a dabber bottle. Some plant species re-sprout after this treatment and follow up work may be required to kill the plant effectively. A non-selective herbicide should be used for the cut and paint method. A non-selective herbicide formulated for use around waters (e.g. RoundUp® Biactive™) is required when working near waterways or sensitive areas.

Cut-Paint method

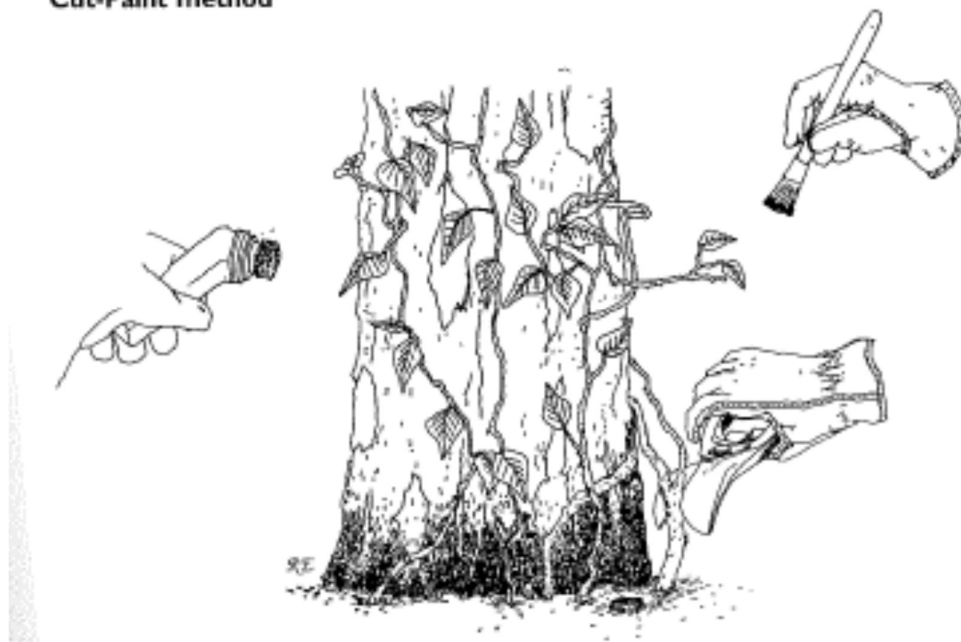


Figure 4: The cut and paint method (Muyt 2001)

Stem scrape

The stem scrape method is used to control vines or woody shrubs and herbaceous weed species such as *Sida* sp and *Solanum mauritianum* (Wild Tobacco Bush). However, this method is not suitable for most herbaceous climbing species such as Bridal Creeper (*Asparagus asparagoides*) or Balloon Vine (*Cardiospermum grandiflorum*).

The stem scrape method involves using a sharp knife to scrape back the top layer of bark from the shrub or vine 20-30cm long. An appropriately mixed herbicide needs to be applied immediately (within 30 seconds) using a dabber bottle (**Figure 5**). The root system of the plant should not be disturbed until the plant has died as this may reduce the effectiveness of the herbicide. Skirting method may be used in conjunction with stem scrape. This method is especially important to remove large infestations of vines within the canopy layer. Skirting involves cutting the vines within the canopy at chest height. This will allow an increase in the amount of light and resources to the canopy trees through the reduction of plants biomass.

Spot spraying grasses and other weeds

The most important issue to consider when controlling grasses is to understand their active growing period. Some species are only actively growing in late winter - spring, while other species are actively growing in spring – summer.

The spraying of grasses needs to be undertaken while they are actively growing, but before their flowering season to prevent seed set. Grasses may be slashed using a brush cutter before they are sprayed to remove any dead foliage and to promote the growth of new foliage. The grasses should be sprayed, using a knap-sack sprayer, once new growth has sprouted ensuring herbicide mix is sprayed carefully to prevent off target damage from occurring.

If adjacent aquatic environments, a non-selective herbicide suitable for use near waterways (e.g. RoundUp® Biactive™) should be used. However, in circumstances away from aquatic environments the use of grass selective herbicides may be suitable to be used (i.e. Fusillade®). The use of a grass selective herbicide will prevent off target damage to broad leaf species. Spray drift should be kept at a minimal and correct handling and application must be followed to ensure non-target impacts on native species. Spot spraying should not be applied in sensitive areas.

Spot spraying is also suitable for small patches of emerging saplings (e.g. Privets or Balloon Vine). Intensive spraying is usually done during primary weed control and is usually reduced during consecutive weed control.

Hand removal / manual removal

The hand removal or pulling of weeds is suitable for many species of weeds as long as they have a shallow root system (**Figure 6**). This includes woody weeds, grasses and herbaceous species. It is useful for follow up work on woody weeds to control seedlings. The hand pulling of weeds involves pulling the plant as close to the base as possible and ensuring the entire tap root is pulled out of the soil. This usually results in soil disturbance and the soil should be replaced and compressed to prevent further weed invasion.

Some weeds require additional effort to ensure the entire regenerative parts are removed; this may require the use of a hand mattock, knife or trowel. Crowning involves using a knife to cut the roots around the crown of the plant. This method is suitable for *Cirsium vulgare* (Spear Thistle) (**Figure 7**).

Management of weed waste

All fruiting parts and tubers should be carried off site and composted at a registered green waste disposal facility. Unless otherwise specified, non-fruiting organic waste may remain in-situ. When leaving debris *in situ* it should be 'rafted'; dead wood should be laid on the ground first then stacked with the cut, living material on top. This keeps the live tips off the ground, preventing them from re-sprouting. Black plastic sheets can be used to accelerate the composting process.

BUSH REGENERATION INFORMATION SHEET

Control of Vines and Scramblers

Examples of vines include: ● balloon vine, morning glory, honeysuckle, cape ivy, jasmine, madeira vine, blackberry

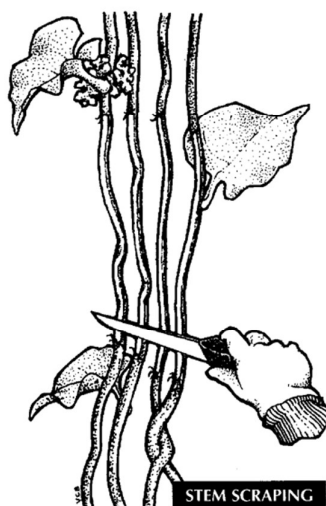
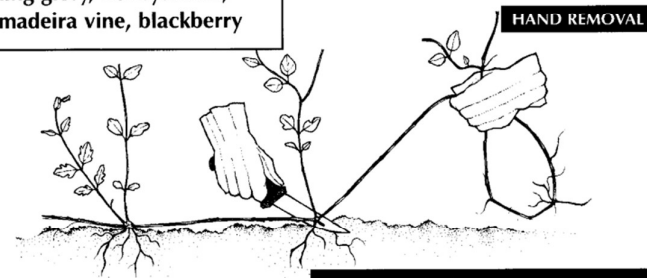
METHODS OF REMOVAL

1 HAND REMOVAL

- STEP 1** Take hold of one runner and gently pull it along the ground towards you.
- STEP 2** 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.
- STEP 3** The major root systems need to be removed manually or scrape/cut and painted with herbicide.
- STEP 4** Bag any reproductive parts.

2 STEM SCRAPING

- STEP 1** With a knife, scrape 15 to 30 cm of the stem to reach the layer below the bark/outer layer.
- STEP 2** Immediately apply herbicide along the length of the scrape.



considerations

- A maximum of half the stem diameter should be scraped. Do not ring bark.
- Larger stems (>1 cm) should have two scrapes opposite each other.
- Aerial tubers on madeira vine should die with the plant when stem scraping is used. Those that fall from the plant in the scraping process need to be bagged.
- Vines can be left hanging in trees after treatment.



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Illustrations: V. Bear

Figure 5: Control of vines and scramblers (AABR 2010)

BUSH REGENERATION INFORMATION SHEET

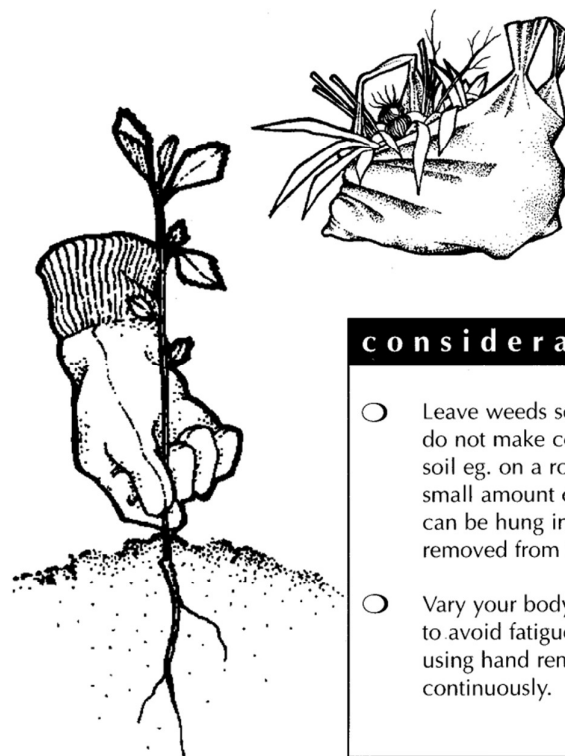
Control of Small Hand-pullable Plants

To Control: ● Small soft weeds eg. fleabane, crofton weed, small grasses
● Seedlings of any weeds including privet, lantana, moth vine

METHODS OF REMOVAL

1 HAND REMOVAL (Minimal Disturbance)

- STEP 1** Gently remove any seeds or fruits and carefully place into a bag.
- STEP 2** Grasp stem at ground level.
- STEP 3** Rock plant backwards and forwards to loosen roots, and pull out gently.
- STEP 4** Carefully tap the roots to dislodge any soil. Replace disturbed soil and pat down.



considerations

- Leave weeds so that roots do not make contact with soil eg. on a rock - a small amount of debris can be hung in a tree or removed from the site.
- Vary your body position to avoid fatigue when using hand removal continuously.



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Illustrations: V.Bear

Figure 6: Hand pulling method (AABR 2010)

BUSH REGENERATION INFORMATION SHEET

Control of Weeds with Underground Reproductive Structures

- Examples: Weeds with
- Tap roots - catsear, dandelion
 - Rhizomes - asparagus fern, ginger plant
 - Bulbs and corms - oxalis, onion weed, watsonia, freesias, montbretia
 - Tubers - madiara vine, arrow head vine

METHODS OF REMOVAL

① HAND REMOVAL OF PLANTS WITH A TAPROOT

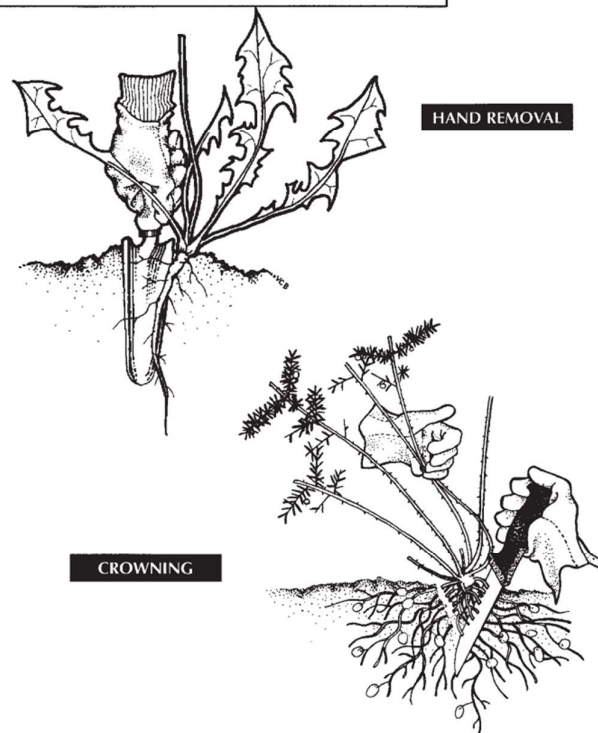
Examples: Paddy's lucerne, dandelion

- STEP 1** Gently remove and bag seeds or fruit.
- STEP 2** Push a narrow trowel or knife into the ground next to the taproot. Carefully loosen soil. Repeat this step around the taproot.
- STEP 3** Grasp stem at ground level, rock plant back wards and forwards and pull gently.
- STEP 4** Gently tap the roots to dislodge soil. Replace disturbed soil and lightly pat down.

② CROWNING (Many grasses can be crowned)

Example: asparagus fern

- STEP 1** Gently remove and bag stems with seed or fruit.
- STEP 2** Grasp the leaves or stems together so that the base of the plant is visible.
- STEP 3** Insert, at an angle, a knife or lever, close to the "crown".
- STEP 4** Cut through all the roots around the crown.
- STEP 5** Remove and bag the crown.



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Figure 7: Crowning method (AABR 2010)

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