

## APPENDIX 3 : Weed management plan

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### Table of Contents

<b>1</b>	<b>Introduction.....</b>	<b>43</b>
1.1	The Weed Problem .....	43
1.2	Legislative Background for Weed Management .....	43
1.2.1	Pest Plants and Animals Act 2005.....	44
1.2.2	ACT Weeds Strategy.....	44
<b>2</b>	<b>Weeds within the Site .....</b>	<b>45</b>
<b>3</b>	<b>Control Methods .....</b>	<b>47</b>
3.1	Topsoil Salvage Strategy.....	47
3.1.1	Prior to Construction.....	47
3.1.2	During Construction.....	50
3.1.3	After Construction.....	50
3.2	Weed Control Methods.....	50
3.2.1	Herbicide application .....	50
3.2.2	Cut and paint.....	51
3.2.3	Scrape and paint .....	51
3.2.4	Stem injection.....	51
3.2.5	Basal bark treatment .....	51

# 1 Introduction

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The terms "weed" and "pest plant" are used to mean the same thing: a plant which, because of its characteristics and location, is causing economic, ecological, physical or aesthetic problems.

Weeds are prevalent throughout the ACT and occur in conservation areas, farm land, forests, parkland, some urban gardens, along waterways and on road verges. The proliferation of weeds is of growing concern to both the Government and the community. The further introduction and spread of weeds has the potential to worsen the current situation.

## 1.1 The Weed Problem

Invasive weeds are a serious problem in Australia. Weeds endanger the biodiversity of Australia's unique waterways, National Parks, and National Heritage listed areas. By out-competing native plant species, weeds threaten their survival and reduce the plant diversity needed to support indigenous insects, birds and animals. Changes to the natural flora cover can lead to other negative environmental impacts, including increased soil erosion and greater bushfire intensities that further damage the land and the native organisms that rely on it.

Agriculturally, weed species can reduce or contaminate crop yields and poison or injure livestock, decreasing productivity. Farmers are often forced to invest significant amounts in controlling invasive species on their properties, adding to the costs of production.

Less commonly recognised is the impact weeds have on people's health. Weeds cause significant human health problems, with introduced species making up 20 out of the 25 major seasonal allergens in Australia. Asthmatics and hay fever sufferers pay the price when introduced allergenic plants like ryegrass and ragweed release their pollen each year.

Most weeds in Australia were, and still are, intentionally introduced for agricultural or ornamental purposes. While these plants have formed the basis of important industries and beautiful gardens, many have also gone on to become serious weeds – 70 per cent of Australia's weeds are ornamental garden plants that have 'jumped the garden fence'. Some important commercial species, such as the radiata pine and the European olive, are also serious environmental weeds.

More than 27,000 species of alien plants have been introduced to Australia since European colonisation, with new species being introduced every year. About 10 per cent of introduced species become naturalised in their new habitat, meaning they can maintain their populations in the wild without human cultivation. One in ten naturalised plants become weeds, and have a negative impact on native biodiversity, agriculture, or both. The price paid for species which become weeds is tremendous, both in economic and environmental terms.

Economically, weeds have been estimated to cost Australian agriculture a total of \$4 billion every year: One in every seven dollars of farm income is spent on the control of weeds. The health costs of weeds are estimated at over a billion dollars annually, when medical treatment, drugs and time off work are added up – and money can't measure the human suffering caused by persistent health problems.

Environmentally, weeds have caused the extinction of four known species of Australian native plants, and 57 more are, or will soon become, threatened because of invasive introduced plants. Species like rubber vine in North Queensland have the potential to destroy entire native ecosystems by supplanting indigenous vine thickets, threatening native animals as well as plants. Vast areas of Australia and nearly every kind of native ecosystem are affected by introduced plants, from oceans and waterways to rainforests, grasslands and deserts.

## 1.2 Legislative Background for Weed Management

The main legislation governing the management of weeds or pest plants within the ACT include:

- Pest Plants and Animals Act 2005; and
- ACT Weeds Strategy

The legislative context of weed control and management is discussed in the following sections.

### **1.2.1 Pest Plants and Animals Act 2005**

Plants that become weedy can be declared as pest plants by the Minister under the Pest Plants and Animals Act 2005. Being declared, a pest plant can be either:

- a plant that is a pest plant whose presence must be notified to the chief executive;
- a plant that is a pest plant that must be suppressed;
- a plant that is a pest plant that must be contained;
- a plant that is a pest plant whose propagation and supply is prohibited.

Once a plant is declared as a pest plant, under the Act, a plan of management must be prepared for each plant species. Plans for the control of the already declared pest plants are part of the ACT Weed Control Program prepared each year within the ACT Weeds Strategy.

### **1.2.2 ACT Weeds Strategy**

Weed control in the ACT in the past has been undertaken by agencies with land management responsibilities and individual land managers according to local priorities and resources. The result has been a diffuse effort which often failed to recognise the influence of weed problems on neighbouring land on the success of the program.

Although weed control legislation existed its application was cumbersome, and there was very little compliance from either government or private land managers.

The ACT Weeds Strategy has been developed to provide a process for enabling effective and efficient weed control to take place. The Strategy in itself does not control weeds. Control will be achieved by implementing the processes described in the Strategy.

## 2 Weeds within the Site

The following table (Table 1) lists the weed species recorded within the corridor, the tower sites each were present and the status and description of each weed species.

TABLE 4: STATUS OF WEED SPECIES AND WHERE THEY OCCUR AT THE SITE

Weed	Tower Sites Present	Status and Description
Scotch Thistle ( <i>Onopordum acanthium</i> )	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 18, 19, 20, 25, 26, 27, 47, 54, 56, 59, 61, 62, 70, 75, 76, 78, 86, 89, 91, 97, 99, 100, 101, 102, 103, 104, 107, 108, 110, 114, 122, 132.	Environmental Weed  Scotch Thistle grows up to 8 feet tall with the leaves forming a rosette around the stem and becoming spiny-edged. Flowers are numerous, spiny, rounded on the bottom but flat on top, and pale purple to violet in colour. They stand alone on branch tips. The main dispersal method is by seed, but cultivation can spread root pieces, which will establish if soil moisture is adequate. Seeds have a pappus of toothed hairs which helps dispersal by attaching to clothing and animal coats. The pappus is not adequate for wind dispersal of seeds but seed heads and stems can be transported by strong wind and water. Seed can be spread in contaminated hay, silage, grain and farm machinery.
Cocksfoot ( <i>Dactylis glomerata</i> )	2, 3, 4, 5, 44, 47, 50, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 64, 116.	Environmental Weed  Cocksfoot is a densely tufted perennial to 1.5m tall. The inflorescence is dense and one-sided, with spikelets clustered at the ends of branches. Flowers in late spring and early summer. Introduced as a pasture grass for higher rainfall areas, it now also occurs in disturbed creeklines, roadsides and wasteland from Gingin to Albany. Native to Europe.
Phalaris ( <i>Phalaris aquatica</i> )	1.	Environmental Weed  A tall robust tussock grass, with an erect habit. Leaves are blue-green, flat and 1-2cm wide when mature. Tall erect stems carry dense cylindrical seed heads, consisting of numerous crowded overlapping flowers. Seed is spread by animals, in soil, on machinery and vehicles, and in water. The basal parts of the tussock may be broken up and spread in earth-moving or cultivation.
Sweet Briar ( <i>Rosa rubiginosa</i> )	5, 27, 28, 30, 31, 33, 34, 35, 36, 44, 45, 47, 52, 59, 60, 61, 62, 63, 70, 75, 76, 77, 78, 80, 81, 84, 85, 88, 89, 92,	Environmental Weed  Deciduous slender thorny shrub 1 to 1.5m high. Can form large thickets but generally does not do so on the coast. Large (to 5cm) pink flowers

Weed	Tower Sites Present	Status and Description
	94, 97, 98, 99, 100, 101, 108, 110, 111, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 130, 131, 132.	are followed by smooth orange to red "rosehips" which are leathery in texture and full of small seeds. Seed spread by birds and foxes, and in water. It may sucker from the roots if the parent plant is cut down.
Great Mullein ( <i>Verbascum thapsus</i> )	15, 16, 27, 35, 36, 37, 38, 45, 47, 48, 66, 67, 70, 114, 124, 126.	Environmental Weed  Both erect annual or biennial herbs, up to about 1m high, which are usually single stemmed or occasionally branched after the growing tip has been damaged. Leaves are clustered in an erect basal rosette, from which a tall flowering stem arises. Very fine seed is spread in wind and along roadsides in contaminated soil.
Blackberry ( <i>Rubus fruticosus</i> )	16, 33, 34, 36, 37, 38, 40, 44, 45, 60, 62, 64, 66, 67, 68, 69, 73.	ACT Declared Pest Plant Weed of National Significance  Deciduous spreading shrub 1 to 2m high, with large triangular backward-pointing thorns on stems and leaves. Blackberry fruits are large and succulent, ripening to purple-black. Dispersed by birds and foxes. Blackberry also spreads vegetatively by rooting from the branch tips where these touch the ground. It will also sucker from the crown and the roots if the parent plant is cut down.
Firethorn ( <i>Pyracantha angustifolia</i> )	33, 37, 44, 63, 67, 69.	ACT Declared Pest Plant  Spiny evergreen shrub. Clusters of white flowers are followed by small (to 1cm) orange-red berries. Dispersed by birds. Dumped garden waste with fruits on it.
Cobbler's Pegs ( <i>Bidens pilosa</i> )	47.	Environmental Weed  An erect annual or perennial herb with branching habit to about 1m high. Leaves are deeply divided into three toothed lobes, with the terminal lobe larger than the other two. Individual flowers are yellow but are tiny and held in dense terminal clusters in a widely branching flowering head. Burrs attach to livestock, clothing, and are spread in mud and soil. They float on water

## 3 Control Methods

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Topsoil salvage is part of the proposed construction method for the installation of the pads within the powerline route corridor. During construction topsoil will be salvaged to a depth of approximately 300mm and stored for rehabilitation of the site. This could potentially result in the spread of weeds that currently occupy the line to areas that are relatively undisturbed nearby. Strategies to minimise the potential for the spread of weeds throughout the site are detailed in the following section.

### 3.1 Topsoil Salvage Strategy

Topsoil salvage needs to be planned to minimise the spread of weeds originating from the topsoil seed bank, while making best use of the native seed bank. In selecting which areas of topsoil are to be salvaged and re-used, consideration needs to be given to the probable level of weed seed in the soil. Inspection of the tower sites and easement indicated that weed infestation is generally low along the length of the line. As such this is not expected to constitute a significant restraint to salvaging topsoil. However it is recommended that topsoil is only salvaged from sites where weeds have been shown to have been suppressed, or that contain very few weeds.

The aim of the weed management and the topsoil re-use strategy is to minimise the spread of exotic species during the construction phase from the topsoil seedbank and make best use of the native soil seedbank. Two main measures would be applied to minimise the spread of weeds as follows:

- Reuse of topsoil from areas with low weed infestation; and
- Disposal (burying) of soil from areas of high weed infestation.

The methods and timing for controlling weeds at the topsoil salvage locations are detailed in the following section.

The most appropriate weed control strategies usually involve more than one control measure, and involve rehabilitation of the site to prevent re-infestation. Site rehabilitation aims to fill the gap left by the removal of a weed with a desirable plant. Such integrated control programs, while more complex, are generally more effective in the long term.

Weed control in Australia currently relies heavily on herbicide use. These chemicals have been developed to be highly specific in application. They are usually effective against a particular species or group of species and are of low toxicity to humans and other animals. The convenience and effectiveness of chemical control measures means that they will be heavily relied on, at least in the near future or until alternative, effective methods are available.

Biological control measures usually involve the introduction of predators or diseases from a weed's area of origin. The testing and introduction of biological control agents is, however, expensive, time consuming and often ineffective by itself.




Physical control measures - such as grubbing, cutting, grazing and use of fire - have roles in particular situations.




#### 3.1.1 Prior to Construction



It is recommended that areas where topsoil is to be salvaged are treated using the control methods in Table 2 for each weed species prior to construction works. This will ensure that weed species will not compete with native species within the soil seedbank, once it has been spread on areas after construction as part of the rehabilitation works at the site.

Construction areas where topsoil is to be salvaged should be inspected by a suitably qualified person (familiar with weed identification) prior to construction to ensure that all weeds have been suppressed sufficiently.

TABLE 5: CONTROL METHODS FOR WEEDS OCCURRING WITHIN THE SITE

Name	Picture	Control Method
<p>Scotch Thistle (<i>Onopordum acanthium</i>)</p>		<p>Thisistles can be chipped out with a mattock (hold the top of the plant down to the ground with one foot to get the spiny leaves away from your hands while chipping, or catch them while still in the rosette stage). Spot spraying with selective herbicide or boom spraying can be used for larger infestations.</p>
<p>Cocksfoot (<i>Dactylis glomerata</i>)</p>		<p>Since Cocksfoot rootstocks do not spread, pulling out young plants can be an effective small-scale control. For small patches, use hand pulling or careful hoeing of the grass clumps in early summer before the seed sets.</p> <p>Spot spraying with selective herbicide or boom spraying can be used for larger infestations.</p>
<p>Phalaris (<i>Phalaris aquatica</i>)</p>		<p>Heavy grazing early in the season can reduce seed set, but putting stock in after the plants have begun seeding will only spread the seed. Regular slashing can reduce seed set, and if cut frequently and hard enough, may kill plants. This can reduce the density of stands, making it easier to mop up the survivors with herbicides.</p> <p>Dig or spot spray isolated plants, and remove the seed heads for safe disposal.</p>

Name	Picture	Control Method
<p>Sweet Briar (<i>Rosa rubiginosa</i>)</p>		<p>Spraying with a woody weed specific herbicide is the simplest method of control. Goats provide very good control. However, they need good fencing, and are also rough on native vegetation. Briar rose can be dug out, but will re-sprout if any roots are left behind.</p>
<p>Great Mullein (<i>Verbascum thapsus</i>)</p>		<p>Chip out prior to seeding. Be sure to take the growing crown out, or the plant will re-sprout.</p>
<p>Blackberry (<i>Rubus fruticosus</i>)</p>		<p>Blackberry should be inspected during summer-autumn and herbicide treatment planned for any infestations that are not attacked heavily by rust. The biological control blackberry leaf rust <i>Phragmidium violaceum</i>, attacks the leaves, is now present throughout all areas of southern Australia where blackberries are a problem. Research has shown that spraying herbicides after the rust has killed some leaves gives equal or better control than application earlier in the season.</p> <p>Where rust is having little impact, the use of herbicides is usually necessary since mature blackberry is able to regenerate readily from roots following burning or slashing.</p> <p>In general, the best time to spray blackberry is during the flowering- fruiting period, but the effective spraying season can start before flowering and extend long after fruiting, into autumn.</p>

Name	Picture	Control Method
Firethorn ( <i>Pyracantha angustifolia</i> )		For large plants, cut and paint. Seedlings and smaller plants can be hand-pulled or dug out. Root suckers are likely to arise after cutting the parent plant, and these will need follow-up cutting and painting or spraying.
Cobbler's Pegs ( <i>Bidens pilosa</i> )		If possible, seed heads should be carefully cut from the plant and bagged before uprooting or spraying the plant. Small infestations can be pulled by hand. Large areas of infestation can be sprayed. Continual follow-up is necessary, as the prolific seed can remain dormant in soil for several years.

### 3.1.2 During Construction

If weeds sprout in construction areas while construction works are being carried out, it is recommended that they are treated with the control measures outlined in Table 5 for each weed species. Inspections of construction areas by a suitably qualified person should occur during the construction process on a weekly basis and prior to topsoil being replaced within construction areas. This will ensure that new weeds have not spread into disturbed areas. If weeds are found within these disturbed areas or on topsoil stockpiles, the control methods within Table 5 should be used to treat the weeds.

### 3.1.3 After Construction

Upon completion of construction at each of the tower sites, the topsoil will be spread over disturbed areas. Appropriate sediment control structures will be placed in areas of steep topography to ensure that salvaged topsoil does not erode.

It is recommended that one month after the completion of construction activities the disturbed areas are inspected for signs of weed infestations by a suitably qualified person. If weeds are found at these sites, the appropriate control method detailed in Table 5 should be implemented at this time.

As part of Transgrid's routine maintenance activities of the alignment, all weeds within the alignment should be continually suppressed and destroyed. Monitoring of the alignment, particularly the areas where salvaged topsoil has been re-applied, should be completed every six months for two years after completion of the works, with appropriate weed control methods completed as needed.

## 3.2 Weed Control Methods

The following section details the various weed control methods discussed in Table 5.

### 3.2.1 Herbicide application

Spraying should not be done in windy conditions. If plants are tall, it may be easier and safer to slash them first and spray when there is vigorous regrowth. If old grass tussocks do not contain

many actively growing leaves, they may also be better slashed first to promote new growth which will take the chemical up more readily. Avoid spraying non-target plants, especially when spraying vines whose foliage may be entangled with that of the supporting plant. To minimise damage to other plants use a selective herbicide if possible. Mix it to the right concentration for the target species (found on the label) and spray to thoroughly wet foliage, but no more. If the plant you are treating has waxy leaves, you may need to add a penetrant to improve take-up of the herbicide. Adding dye makes it much easier to see where you have sprayed.

Weed wipers can be used to apply herbicides to foliage in a more controlled manner. There are a range of possibilities here, from wiping herbicide onto individual plants with a sponge in a gloved hand (useful for bulb foliage), to hand-held wick wipers, to larger wipers towed behind a tractor or quad bike. This method can be useful for removing taller weeds without affecting the pasture beneath them. Generally wiping with two passes at 90° to each other is needed to ensure sufficient coverage. Check whether the chemical you plan to use is registered for this method of application.

### **3.2.2 Cut and paint**

Cut and paint is suitable for woody weeds. The plant is cut off close to ground level with a horizontal cut, and undiluted herbicide (usually glyphosate) applied immediately to the cut surface. If you are too slow air is sucked into the sap vessels, preventing take-up of the herbicide. In some plants, such as willows, it may be necessary to apply herbicide to both the stump and the cut end of the rest of the tree. This ensures that the top part of the plant dies, rather than taking root again if it is left lying on moist soil. For a larger stump, only the outer edge, just inside the bark needs to be treated, not the whole surface. Wear rubber gloves, and avoid moving around carrying an open container of herbicide. This method and the two below are best done as a two person job.

### **3.2.3 Scrape and paint**

Scrape and paint is used for large vines and scrambling plants with a woody stem. Scrape 20 to 100cm of the stem with a knife, to expose the sapwood just below the bark. Within 20 seconds, apply undiluted herbicide to the scraped section. Do not scrape right around the stem, do only a third of the diameter. Stems over 1cm in diameter can be scraped on two sides. If killing vines with herbicide, leave them to die in place. Pulling them down can damage the plants they are growing over.

### **3.2.4 Stem injection**

Stem injection is used on woody weeds where you want them to die in place, rather than cutting them down. There are purpose-built stem injection devices, but the job can also be done with a hammer and chisel or a cordless drill. An angled cut or hole is made down into the sapwood, just below the bark, and apply undiluted herbicide into the cut immediately. Do not drill too deeply, or it will penetrate the heartwood, which does not take up the herbicide.

### **3.2.5 Basal bark treatment**

Basal bark treatment is used on young woody weeds and root suckers. Diluted herbicide (check label for rates) is painted or sprayed onto the bark at the base, from ground level to 30cm high.