



Paling Yards Development Pty Ltd

Biosecurity Risk Management Plan

Paling Yards Wind Farm

25 November 2022

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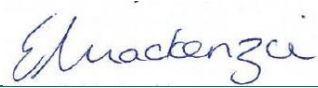
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25 November 2022

Biosecurity Risk Management Plan

Paling Yards Wind Farm



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Acronyms and Abbreviations

Name	Description
ALA	Atlas of Living Australia
APVMA	Australian Pesticides and Veterinary Medicines Authority
BDAR	Biodiversity Development Assessment Report
DPI	Department of Primary Industries
EIS	Environmental Impact Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERM	Environmental Resources Management
kV	Kilovolt
LGA	Local Government Areas
LLS Act	<i>Local Land Services Act 2013</i>
RSPAMP	Regional Strategic Pest Animal Management Plan
RSWMP	Regional Strategic Weed Management Plan
WoNS	Weeds of National Significance
WTG	Wind Turbine Generator

1. INTRODUCTION AND PROJECT OVERVIEW

Environmental Resources Management Australia Pty Ltd (ERM) has been commissioned by Tract on behalf of Paling Yards Development Pty and Global Power Generation Australia (GPG) to prepare this Biosecurity Risk Management Plan for the proposed Paling Yards Wind Farm.

The Paling Yards Wind Farm is proposed to be constructed and operated to the south of Oberon, within the Central Tablelands region of New South Wales. The Project boundary and proposed layout including access points are shown in **Figure 1-1** and **Figure 1-2**. The Biosecurity Risk Management Plan puts in place management practices that will be used to undertake manage and identify biosecurity risks within the Project Area, including weed and pest animal species.

The proposed Project Area is currently made up of four separate landholdings over approximately 4,600 hectares referred to as 'Mingary Park', 'Paling Yards', 'Middle Station' and 'Hilltop'. The current land use is agricultural, and this will continue throughout the Project construction phase and during the life of the Project.

The Project is proposed to consist of up to 47 wind turbine generator locations. The Project would also include:

- Transmission corridor of approximately 9km long and 10m wide with poles 200 – 250 m apart (with a 35m wide easement either side of the overhead transmission lines);
- Three (3) meteorological monitoring masts, fitted with anemometers, wind vanes, temperature gauges and other electrical equipment;
- Wind farm and substation control room and facilities building;
- Obstacle lighting to selected turbines (if deemed necessary);
- On-site electrical substation and approximately 9.0 km of overhead power line of up to 500kV;
- Underground electrical and communication cable network linking turbines to each other and the proposed on-site substation;
- Removal of native vegetation and additional vegetation planting to provide screening;
- Upgrades to existing local road infrastructure including several access points from Abercrombie Road and establishment of internal unsealed tracks for access to turbines and infrastructure; and
- Temporary batching plant to supply concrete during the construction phase.

The above activities could contribute to the potential introduction or spread of weeds and facilitate pest animal incursions. The activities that could contribute to biosecurity risk have been categorised as follows:

- Movement of vehicles to, from and throughout site;
- Ground disturbance (track work);
- Vegetation clearing;
- Delivery of materials; and
- Ongoing site management.

1.1 Purpose and Objectives

The purpose of this Biosecurity Risk Management Plan is to identify and assess existing and potential biosecurity risks as well as to determine and recommend measures to prevent, minimise and/or eliminate these biosecurity risks (such as weed and pest animal species).

This Biosecurity Risk Management Plan aims to cover from the construction phase through the operational stage of the Project and seeks to ensure compliance with the *Biosecurity Act 2015* and the General Biosecurity Duty through adopting evidence-based and suitable management practices.

Upon approving this document it is expected Paling Yards Development Pty Ltd will be committed to following the Biosecurity Risk Management Plan and adopt a commitment to protect Australia's and New South Wales biosecurity.

1.2 Roles and Responsibilities

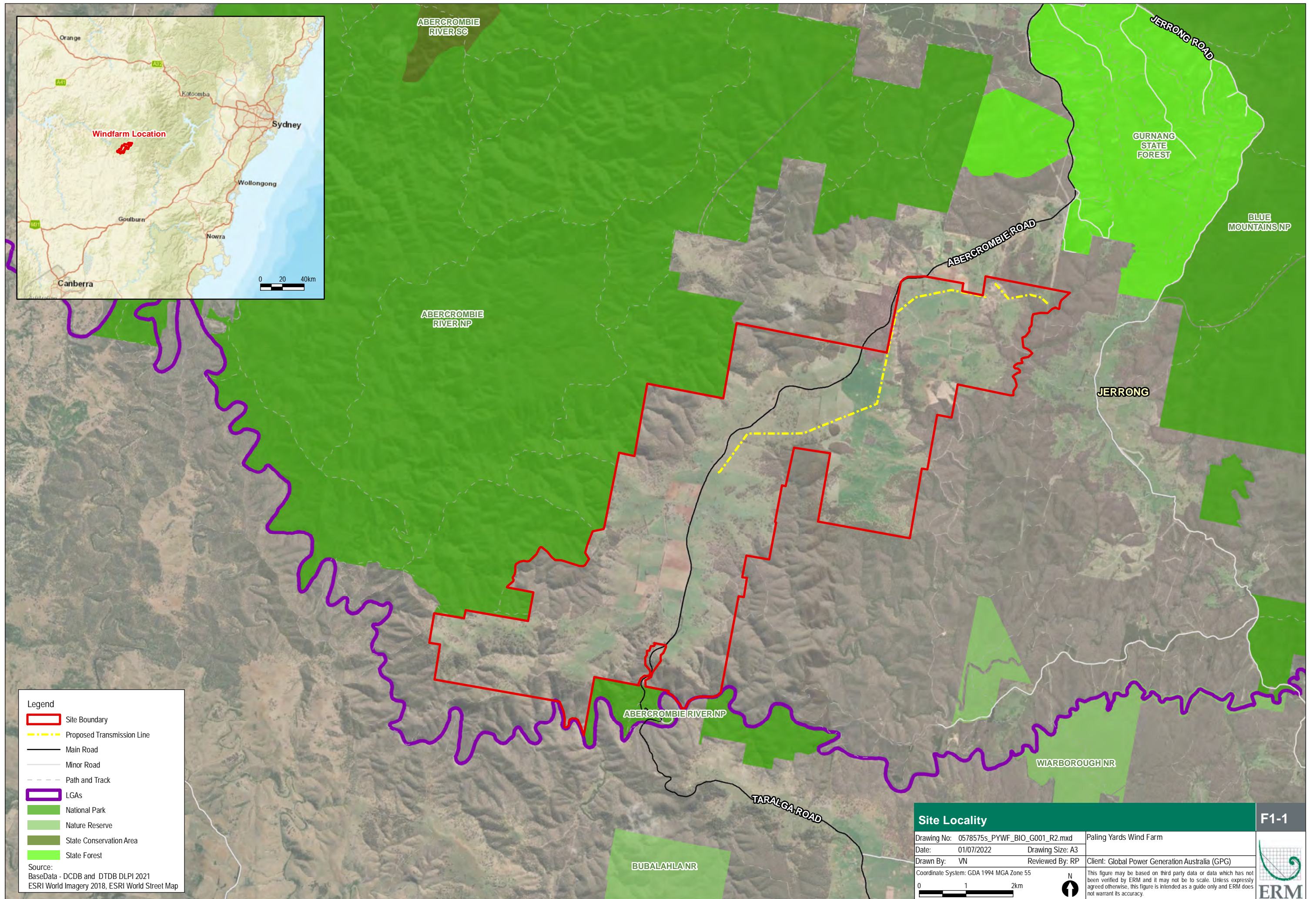
All personnel are responsible to:

- Minimise biosecurity risks, including spread of pest species;
- Participate in biosecurity training if required;
- Undertake mitigation and control measures such as washdown and communication procedures;
- Implement Biosecurity Risk Management Plan procedures; and
- Adhere to the General Biosecurity Duty.

Delegated Environmental managers and/or supervisors are responsible for implementing the monitoring and management strategy.

It is expected that Paling Yards Development Pty Ltd will resource, implement, monitor and maintain the Biosecurity Risk Management Plan.

As this report develops and following each review period, it is expected that the roles and responsibilities will be refined and expanded.

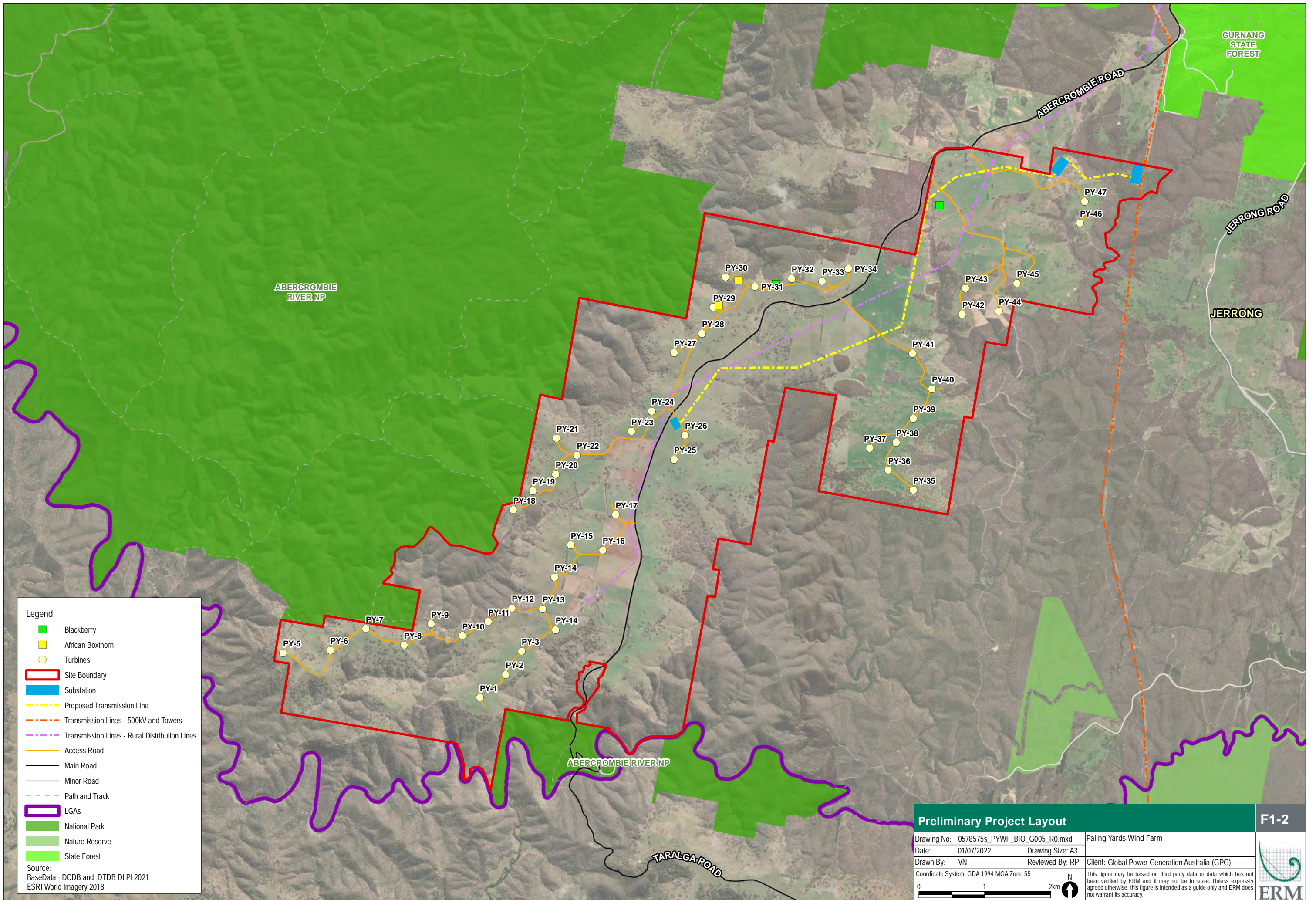


Legend

- Site Boundary
- Proposed Transmission Line
- Main Road
- Minor Road
- Path and Track
- LGAs
- National Park
- Nature Reserve
- State Conservation Area
- State Forest

Source:
BaseData - DCDB and DTDB DLPI 2021
ESRI World Imagery 2018, ESRI World Street Map

Site Locality		F1-1
Drawing No: 0578575s_PYWF_BIO_G001_R2.mxd	Paling Yards Wind Farm	
Date: 01/07/2022	Drawing Size: A3	Client: Global Power Generation Australia (GPG)
Drawn By: VN	Reviewed By: RP	
Coordinate System: GDA 1994 MGA Zone 55		
		This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.



Legend

- Blackberry
- African Boxthorn
- Turbines
- Site Boundary
- Substation
- Proposed Transmission Line
- Transmission Lines - 500kV and Towers
- Transmission Lines - Rural Distribution Lines
- Access Road
- Main Road
- Minor Road
- Path and Track
- LGAs
- National Park
- Nature Reserve
- State Forest

Source:
BaseData - DCDB and DTDB DLPI 2021
ESRI World Imagery 2018

Preliminary Project Layout		F1-2
Drawing No: 0578575s_PYWF_BIO_G005_R0.mxd		Paling Yards Wind Farm
Date: 01/07/2022	Drawing Size: A3	
Drawn By: VN	Reviewed By: RP	
Coordinate System: GDA 1994 MGA Zone 55		<small>This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.</small>

2. LEGISLATION

Table 2.1 below provides a description of the relevant legislative context. This document addresses the objectives and requirements of the legislation as it relates to the identification and management of existing and potential biosecurity risks.

Table 2-1 Legislation applicable to this Biosecurity Risk Management Plan

Biosecurity Act 2015 (NSW) and Biosecurity Regulation 2017 (NSW)

The NSW *Biosecurity Act 2015* came into effect on 1 July 2017, effectively replacing the *Noxious Weeds Act 1993*, and 13 other Acts, with a single Act. Under the *Noxious Weeds Act* all landowners had a responsibility to control noxious weeds on their property. Under the *Biosecurity Act* broadly the same responsibility will apply and will be known as a General Biosecurity Duty.

The General Biosecurity Duty states “Any person who deals with biosecurity matter or a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, carrier or dealing has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.” The general biosecurity duty applies to all weeds listed in Schedule 3 of the *Biosecurity Act 2015*. Primary weeds have been identified in different Local Government Areas (LGA) due to the level of threat infestation they represent, some of the Weeds of National Significance (WoNS) are also listed as Primary Weeds in LGAs.

Having a biosecurity management plan is voluntary but if there is a biosecurity management plan in operation, it will become a legal requirement to obey relevant signs, procedures and measures outlined in the biosecurity management plan. The offence will not apply if a biosecurity management plan is not in place or is not being implemented.

Mandatory duties outlined in the *Biosecurity Act 2015*:

- Duties relating to prohibited matter and prohibited dealings: The Act defines pests, diseases, and weeds that are illegal throughout the State or in a part of the State because they present the highest risks to our economy, environment, and community. These are generally not found in Australia or maybe present in other State or Territory but not NSW. It is an offence to deal with a prohibited matter or prohibited dealing.
- A duty to notify biosecurity events: It is a requirement of people to report anything unusual that may present a biosecurity risk to the authorities. This includes seeing a prohibited matter or prohibited dealing.
- General Biosecurity Duty: Any person who deals with biosecurity matter or a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, carrier or dealing has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.

The *Biosecurity Act 2015* places restrictions on the trade and movement of plants that harm the NSW environment, economy and community. Those plants are called 'priority weeds' and the restrictions on trade and movement apply to all parts of the plant including cuts, cultivars and hybrids.

'State priority weeds' MUST NOT be sold anywhere in NSW. People that buy or sell state priority weeds in NSW are committing an offence under the *Biosecurity Act 2015* that carries large penalties. The following legal instruments apply:

- Prohibited Matter – A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. The definition of 'dealing' is broad and includes having, buying, selling, moving, growing and disposal.
- Control Order – Requires all parts of the plant to be destroyed until eradicated.
- Mandatory Measure (Prohibition on Dealings) – Must not be imported into the State or sold.

'Regional priority weeds' should not be sold or moved in certain Local Land Services regions of NSW. If you buy, sell or move regional priority weeds you may be failing to discharge your general biosecurity duty to prevent, eliminate or minimise risks as far as is reasonably practicable, and this also carries large penalties.

Pesticides Act 1999 (NSW)

The *Pesticides Act 1999* is the primary legislation controlling the use of pesticides (including herbicides) in NSW and is administered by the NSW Environment Protection Authority (EPA). The underlying principle of the Act is that pesticides must be used only for the purpose described on the product label and all the instructions on the label must be followed. Consequently, all label directions must be read by, or explained to, the user before each use of the pesticide.

All pesticide users should take reasonable care to protect their own health and the health of others when using a pesticide. They should also make every reasonable attempt to prevent damage occurring from the use of a pesticide, such as off-target drift on to sensitive areas or harm to endangered and protected species.

Under the Act, all pesticide users in NSW must:

- only use pesticides registered or permitted by the Australian Pesticides and Veterinary Medicines Authority (APVMA);
- obtain an APVMA permit if they wish to use a pesticide in a way not covered by the label;
- read the approved label and/or APVMA permit for the pesticide product (or have the label/permit read to them) and strictly follow their directions;
- only keep registered pesticides in containers bearing an approved label; and
- prevent injury to people, damage to property and harm to non-target plants and animals from using a pesticide.

2.1 Standards, Guidelines and Resources

Other standards, guidelines and resources used in the preparation of this management plan and relevant to biosecurity risk mitigation within the region include:

- Department of Agriculture, Fisheries and Forestry - Foot-and-mouth disease: a threat to Australian livestock 2022
- Australian Pest Animal Strategy 2017–2027
- Australian Weeds Strategy 2017–2027
- Central Tablelands Regional Strategic Weed Management Plan 2017 – 2022
- Central Tablelands Regional Strategic Pest Animal Management Plan 2018 – 2023
- The NSW Wild Dog Management Strategy 2017-2021
- Central Tablelands Local Land Services Wild Dog Management Plan 2021-2026
- NSW Weed Control Handbook
- Centre for Invasive Species Solutions – Feral Scan (a pest animal recording and management tool) <https://www.feralscan.org.au>

3. BIOSECURITY RISKS

Monitoring is essential to ensure invasive species are not able to establish in the Project Area.

The construction phase of the Project has the highest potential to create disturbance and potentially spread weed and pest species. The most significant vectors for the spread of weeds are from the increased movement of vehicles and disturbances to soil from track work and vegetation clearing. Weed seeds can be transported into and through the site on clothing, vehicle wheels and undercarriages.

3.1 Weeds of National Significance

Under the National Weeds Strategy, 32 introduced plants have been identified as Weeds of National Significance (WoNS). A list of 20 was endorsed in 1999 and a further 12 were added in 2012. These weeds are regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts. A list of the Weeds of National Significance is shown in Table 3-1.

Table 3-1 Weeds of National Significance

Scientific Name	Common Name
<i>Lycium ferocissimum</i>	African Boxthorn
<i>Alternanthera philoxeroides</i>	Alligator Weed
<i>Asparagus aethiopicus</i>	Asparagus Fern
<i>Tamarix aphylla</i>	Athel Pine
<i>Jatropha gossypifolia</i>	Bellyache Bush
<i>Chrysanthemoides monilifera</i>	Bitou bush / Boneseed
<i>Rubus fruticosus agg.</i>	Blackberry
<i>Chrysanthemoides monilifera subsp. monilifera</i>	Boneseed
<i>Asparagus asparagoides</i>	Bridal Creeper
<i>Cytisus scoparius</i>	Broom
<i>Cabomba caroliniana</i>	Cabomba
<i>Dolichandra unguis-cati</i>	Cat's Claw Creeper
<i>Nassella neesiana</i>	Chilean Needle Grass
<i>Sagittaria platyphylla</i>	Delta Arrowhead
<i>Senecio madagascariensis</i>	Fireweed
<i>Genista linifolia</i>	Flax-leaved Broom
<i>Andropogon gayanus</i>	Gamba Grass
<i>Ulex europaeus</i>	Gorse
<i>Hymenachne amplexicaulis</i>	Hymenachne
<i>Lantana camara</i>	Lantana
<i>Pereskia aculeata</i>	Leaf Cactus
<i>Anredera cordifolia</i>	Madeira Vine
<i>Prosopis spp.</i>	Mesquite
<i>Mimosa pigra</i>	Mimosa
<i>Genista monspessulana</i>	Montpellier Broom
<i>Parkinsonia aculeate</i>	Parkinsonia

Scientific Name	Common Name
<i>Parthenium hysterophorus</i>	Parthenium weed
<i>Annona glabra</i>	Pond Apple
<i>Acacia nilotica ssp. indica</i>	Prickly Acacia
<i>Opuntia spp.</i>	Prickly Pear
<i>Cryptostegia grandiflora</i>	Rubber Vine
<i>Salvinia molesta</i>	Salvinia
<i>Nassella trichotoma</i>	Serrated Tussock
<i>Solanum elaeagnifolium</i>	Silver nightshade
<i>Eichhornia crassipes</i>	Water Hyacinth
<i>Salix spp. except S. babylonica, S.x calodendron and S.x reichardtiji</i>	

3.2 New South Wales Priority Species

The *Biosecurity Act 2015* places restrictions on the trade and movement of plants that harm the NSW environment, economy and community. These plants are called priority weeds and the restrictions on trade and movement apply to all parts of the plant including cuts, cultivars and hybrids.

Prohibited Matter – A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. The definition of 'dealing' is broad and includes having, buying, selling, moving, growing and disposal.

Table 3-2 Prohibited Invertebrates and Weed Species of NSW

Scientific Name	Common Name
Pest Terrestrial Invertebrates	
<i>Anoplolepis gracilipes</i>	Yellow crazy ant
<i>Apis cerana</i>	Asian honeybee
<i>Apis dorsata</i>	Giant honeybee
<i>Apis florea</i>	Dwarf honeybee
<i>Apis mellifera scutellata and its hybrids</i>	Africanised honeybee
<i>Bombus terrestris</i>	Large earth bumblebee
<i>Hypoderma species</i>	Warble fly
<i>Lepisiota frauenfeldi</i>	Browsing ant
<i>Solenopsis geminata</i>	Tropical fire ant
<i>Solenopsis invicta</i>	Red imported fire ant
<i>Solenopsis richteri</i>	Black imported fire ant
<i>Vespa velutina</i>	Asian hornet
<i>Wasmannia auropunctata</i>	Electric ant/Little fire ant
Terrestrial and Freshwater Weeds	
<i>Andropogon gayanus</i>	Gamba grass
<i>Annona glabra</i>	Pond apple
<i>Asparagus declinatus</i>	Bridal veil creeper
<i>Bassia scoparia (excluding subsp. trichophylla)</i>	Kochia

Scientific Name	Common Name
<i>Centaurea stoebe subsp. micranthos</i>	Spotted knapweed
<i>Centaurea xmoncktonii</i>	Black knapweed
<i>Chromolaena odorata</i>	Siam weed
<i>Clidemia hirta</i>	Koster's curse
<i>Cryptostegia grandiflora</i>	Rubber vine
<i>Eichhornia azurea</i>	Anchored water hyacinth
<i>Hieracium spp. (all species except Hieracium murorum)</i>	Hawkweed
<i>Hydrocotyle ranunculoides</i>	Hydrocotyl/Water pennywort
<i>Lagarosiphon major</i>	Lagarosiphon
<i>Limnobium spp. (all species)</i>	Frogbit/Spongeplant
<i>Limnocharis flava</i>	Yellow burrhead
<i>Miconia spp. (all species)</i>	Miconia
<i>Mikania micrantha</i>	Mikania vine
<i>Mimosa pigra</i>	Mimosa
<i>Myriophyllum spicatum</i>	Eurasian water milfoil
<i>Nassella tenuissima (syn. Stipa tenuissima)</i>	Mexican feather grass
<i>Orobanche spp. (all species except the native O. cernua var. australiana and O. minor)</i>	Broomrape
<i>Parthenium hysterophorus</i>	Parthenium weed
<i>Pilosella spp. (all species)</i>	Hawkweed
<i>Stratiotes aloides</i>	Water soldier
<i>Striga spp. (except the native S. parviflora)</i>	Witchweed
<i>Trapa spp. (all species)</i>	Water caltrop
<i>Vachellia karroo (syn. Acacia karroo)</i>	Karoo acacia
<i>Vachellia nilotica (syn. Acacia nilotica)</i>	Prickly acacia

3.3 Regional Priority Species

Regional priority weeds should not be sold or moved in certain Local Land Services regions of NSW. If you buy, sell or move regional priority weeds you may be failing to discharge your general biosecurity duty to prevent, eliminate or minimise risks as far as is reasonably practicable, and this also carries large penalties.

The Central Tablelands Regional Strategic Weed Management Plan (2017-2022) outlines objectives for the Regional Priority Weeds. As outlined within Table 3-3, these objectives are Prevention, Containment and Asset Protection.

Table 3-3 Regional Priority Weed Objectives

<p>Prevention: The following weeds are currently not found in the region, pose significant biosecurity risk and prevention of the biosecurity risk posed by these weeds is a reasonably practical objective:</p>	
<ul style="list-style-type: none"> ■ Burr ragweed (<i>Ambrosia confertiflora</i>) ■ Cyllindropuntia (<i>Cyllindropuntia spp.</i>) (excluding cultivated plants) ■ Horsetails (<i>Equisetum spp.</i>) ■ Harrisia (<i>Harrisia spp.</i>) (excluding cultivated plants) ■ Hygrophila (<i>Hygrophila costata</i>) ■ Long-leaf willow primrose (<i>Ludwigia longifolia</i>) ■ Peruvian primrose (<i>Ludwigia peruviana</i>) ■ Sagittaria (<i>Sagittaria platyphylla</i>) ■ Giant Parramatta grass (<i>Sporobolus fertilis</i>) 	<p>Outcomes to demonstrate compliance with the General Biosecurity Duty:</p> <ul style="list-style-type: none"> ■ The plant is eradicated from the land and the land is kept free of the plant. ■ Land managers mitigate the risk of the plant being introduced to their land. – ■ The plant or parts of the plant are not traded, carried, grown or released into the environment. – ■ Local Control Authority is notified if the plant is found on the land.
<p>Containment: These weeds are widely distributed in parts of the region. While broad scale elimination is not practicable, minimisation of the biosecurity risk posed by these weeds is reasonably practicable:</p>	
<ul style="list-style-type: none"> ■ Giant Reed (<i>Arundo donax</i>) ■ Spiny burrgrass (<i>Cenchrus spinifex</i>) (syn. <i>C. incertus</i>) and <i>Cenchrus longispinus</i> ■ Spanish heath (<i>Erica lusitanica</i>) ■ Honey locust (<i>Gleditsia triacanthos</i>) ■ Coolatai grass (<i>Hyparrhenia hirta</i>) ■ Privet (<i>Ligustrum ssp</i>) ■ Chilean needle grass (<i>Nassella neesiana</i>) ■ African olive (<i>Olea europaea subsp cuspidate</i>) ■ Fireweed (<i>Senecio madagascariensis</i>) ■ Silverleaf nightshade (<i>Solanum elaeagnifolium</i>) ■ Gorse (<i>Ulex europaeus</i>) 	<p>Outcomes to demonstrate compliance with the General Biosecurity Duty:</p> <ul style="list-style-type: none"> ■ Land managers should prevent spread from their land ■ Land managers should mitigate the risk of new weeds being introduced to their land. ■ The Plant should not be bought, sold, grown, carried or released into the environment. ■ Notify local control authority if found.

Asset Protection: These weeds are widely distributed in the Central Tablelands region. While broad scale elimination is not practicable, minimisation of the biosecurity risk posed to certain assets is reasonably practicable:

- | | |
|--|--|
| <ul style="list-style-type: none"> ■ Bridal creeper (<i>Asparagus asparagoides</i>) (Protect conservation and natural environments free of Bridal creeper) ■ Mother-of-millions (<i>Bryophyllum spp.</i>) (Protect conservation, natural environments and grazing land free of Mother-of-millions) ■ Green cestrum – (<i>Cestrum parqui</i>) (Contain within riparian areas to protect grazing land free of green cestrum) ■ Scotch broom/English broom (<i>Cytisus scoparius subsp. scoparius</i>) (Protect conservation and natural environments free of Scotch broom/English broom) ■ Cape Broom (<i>Genista monspessulana</i>) (Protect conservation and natural environments free of Cape broom) ■ Tutsan (<i>Hypericum androsaemum</i>) (Protect conservation, natural environments and grazing land free of Tutsan) ■ St John's wort (<i>Hypericum perforatum</i>) (Protect grazing land free of St John's wort) ■ Ox-eye daisy (<i>Leucanthemum vulgare</i>) (Protect conservation, natural environments and primary production land free of Ox-eye daisy) ■ African boxthorn (<i>Lycium ferocissimum</i>) (Protect primary production land free of African boxthorn) ■ Serrated tussock (<i>Nassella trichotoma</i>) (Protect production land, conservation and natural environments free of Serrated tussock) ■ Tiger pear (<i>Opuntia aurantiaca</i>) (Protect unimproved grazing land free of Tiger pear) ■ Blackberry (<i>Rubus fruticosus</i>) (Protect primary production land, conservation and natural environments free of Blackberry) | <p>Outcomes to demonstrate compliance with the General Biosecurity Duty:</p> <ul style="list-style-type: none"> ■ The plant or parts of the plant have not been traded, carried, grown or released into the environment. ■ Land managers mitigate the risk of the plant being introduced to their land. ■ Land managers reduce impacts from the plant on priority assets. |
|--|--|

3.4 Known Weeds within the Project Area

Ecological surveys conducted in February and October 2021 for the Paling Yards Biodiversity Development Assessment Report (BDAR) (Hunter Ecology 2022) found that the Project Area has been exposed to a long history of pasture improvement and contained cultivated pasture species, such as *Lolium perenne* (Rye Grass), *Hordeum sp.* (Barley Grass), *Poa annua* (Winter Grass), *Dactylis glomerata* (Cocksfoot), *Cenchrus clandestinus* (Kikuyu), *Paspalum dilatatum* (Paspalum), *Holcus lanatus* (Yorkshire Fog) and *Phalaris aquatica* (Phalaris).

As noted in

Table 3-4, three species of exotic flora are declared as Weeds of National Significance (WoNS):

- Blackberry (*Rubus fruticosus*)
- African Boxthorn (*Lycium ferocissium*)
- Serrated tussock (*Nassella trichotoma*)



Derived grassland dominated by *Nassella trichotoma* (Serrated Tussock) and *Rubus fruticosus* (Blackberry). Source: Hunter Ecology 2022



Derived grassland dominated by exotic pasture grasses and *Rubus fruticosus* (Blackberry). Source: Hunter Ecology 2022

These weed species are also considered Priority Weeds of the Central Tablelands, as listed in the Central Tablelands Regional Strategic Weed Management Plan 2017-2022. The Plan recommends that land managers mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. These plants should not be bought, sold, grown, carried, or released into the environment.

Table 3-4 Weed Species Recorded Within the Project Area

Scientific Name	Common Name	Priority Weed	Weeds of National Significance
<i>Rubus fruticosus</i>	Blackberry	✓ Asset Protection	✓
<i>Taraxacum officinale</i>	Common Dandelion		
<i>Holcus lanatus</i>	Yorkshire Fog		
<i>Modiola caroliniana</i>	Red-flowered Mallow		
<i>Rosa canina</i>	Dog Rose		
<i>Cirsium vulgare</i>	Spear Thistle		
<i>Carthamus lanatus</i>	Saffron Thistle		
<i>Malva parviflora</i>	Mallow		
<i>Solanum nigrum</i>	Blackberry Nightshade		
<i>Gamochaeta calviceps</i>	Cudweed		
<i>Lycium ferocissimum</i>	African Boxthorn	✓ Asset Protection	✓
<i>Urtica dioica</i>	Common Nettle		
<i>Nassella trichotoma</i>	Serrated tussock	✓ Asset Protection	✓
<i>Lolium perenne</i>	Perennial Ryegrass		
<i>Trifolium repens</i>	White Clover		
<i>Echium plantagineum</i>	Paterson's Curse		
<i>Plantago lanceolata</i>	Plantago lanceolate		
<i>Lysimachia arvensis/ Anagallis arvensis</i>	Scarlet Pimpernel		
<i>Carduus nutans subsp. nutans</i>	Nodding Thistle		
<i>Conyza sumatrensis</i>	Tall Fleabane		
<i>Hordeum leporinum</i>	Barley Grass		
<i>Rumex acetosella</i>	Red Sorrel		
<i>Veronica persica</i>	Birdeye Speedwell		
<i>Bromus sp.</i>	-		
<i>Spergularia sp.</i>	-		
<i>Conyza bonariensis</i>	-		
<i>Phalaris canariensis</i>	Canary Grass		
<i>Cynodon dactylon</i>	Bermuda Grass		

3.5 Known Pests within the Project Area

Under the *NSW Biosecurity Act 2015*, pest animals are not defined by species. Pest species can be considered as any species (other than native species) that present a significant threat to our biosecurity, biodiversity and economy, environment and community wellbeing as they can:

- prey on livestock and wildlife;
- increase grazing pressure on pastures;
- damage crops and plants;
- compete with native wildlife for food and habitat;
- spread diseases to people and other animals (including stock and pets); and
- damage fences and other infrastructure.

A review of the Preliminary Biodiversity Assessment (ERM 2021) and the Paling Yards BDAR (Hunter Ecology 2022) has confirmed a number of introduced fauna species within the Project Site. These are identified within Table 3-55.

Table 3-5 Pest Animal Species Recorded Within the Project Area

Scientific Name	Common Name	Priority Pest Species*
<i>Canis familiaris</i>	Wild Dog	✓ Asset Protection
<i>Vulpes vulpes</i>	Red Fox	✓ Asset Protection
<i>Dama Dama</i>	Fallow Deer	✓ Asset Protection
<i>Lepus europaeus</i>	Hare	
<i>Oryctolagus cuniculus</i>	Rabbit	✓ Asset Protection
<i>Mus musculus</i>	House Mouse	
<i>Rattus rattus</i>	Black Rat	
<i>Acridotheres tristis</i>	Common Myna	✓ Asset Protection

*Listed in the Central Tablelands Regional Strategic Pest Animal Management Plan 2018 - 2023

4. MANAGEMENT STRATEGY

The following activities have been identified as those that could contribute to the potential introduction or spreading of weeds and facilitate pest animal incursions and otherwise contribute to a biosecurity risk:

- Movement of vehicles to, from and throughout site;
- Ground disturbance (track work);
- Vegetation clearing;
- Delivery of materials; and
- Ongoing site management.

This management strategy prioritises prevention practices, with treatment and control measures used for existing biosecurity matters or where prevention methods fail. The management actions within this strategy aim to minimise the risk of spreading or introducing weed plant species, pest animals and potential pathogens to the Project or surrounding areas and where possible remove and dispose of pest plant and animal species within Project Area. A monitoring program with performance measures/criteria is shown in **Section 0**.

Prevention methods have been prioritised as it is the most cost and outcome beneficial way of dealing with weeds. Once a weed becomes established in an area, eradication and control methods are more expensive and time consuming, and greater effort will be required to control further spread and to reduce its impact. Weeds can spread with movement of goods, animals and vehicles contaminated with weed seeds.

It is assumed that the Project is unlikely to spread plant or animal diseases/pathogens, however any suspicions are to be reported as soon as possible.

4.1 Foot and Mouth Disease

An outbreak of Foot and Mouth Disease (FMD) was identified in May 2022 in Indonesia. It is present in Asia, including in Indonesia, the Middle East, Africa, and parts of South America. While FMD is not currently present in Australia, an incursion of the virus would have severe consequences for Australia's animal health and trade.

Foot and Mouth Disease is a disease that affects cloven-hoofed animals, it is highly contagious and causes fluid filled blisters to form on the lips, tongue, palate, feet and teats of infected animals. FMD is carried by live animals, vehicles and equipment used in transporting and processing animals, as well as in meat and dairy products. Footwear and clothing can also be carriers of FMD.

Signs of Foot and Mouth Disease include:

- Fever;
- Drooling or excessive salivation;
- Reluctance to move; and
- Blisters on the lips, tongue, palate, feet or teats

FMD is a nationally notifiable disease which means it must be reported to a veterinarian or your state/territory agriculture department. Immediately call the Emergency Animal Disease Watch Hotline on 1800 675 888

In addition to existing access protocols and hygiene requirements detailed in Section 4. The following management procedures should be instated:

- Training should be provided to employees and subcontractors to recognise the symptoms and signs of FMD, and how to report observed signs of FMD;

- Access will be restricted to anyone who has been to FMD infected areas, including Indonesia or Bali within the previous seven days;
- Visitors and workers are prohibited from touching or feeding livestock; and
- Footwear and clothing will be free of mud/soil, manure and washed and disinfected before entering site.

4.2 Awareness/ Training

Personnel including contractors involved with the Project throughout all phases should be provided with training and/or resources to ensure that all biosecurity management procedures are made aware of and understood, including:

- Access procedures;
- Vehicle washdown requirements;
- How to identify and report possible biosecurity events;
- Roles and responsibilities;
- Record keeping procedures; and
- Their General Biosecurity Duty.

4.3 Access Procedure

4.3.1 Employees, Contractors, and Visitors

A visitor register should be kept, to record entry, exit and details of movements.

Visitors are required to record entry and exit (times and date) via the visitor register.

Visitors are required to notify site manager/contact upon entry and exit.

Establish a designated parking area for vehicles and equipment, including visitor vehicles.

Employees, contractors and visitors are to ensure their vehicles, equipment, machinery, etc are clean and free of visible mud and plant material. A vehicle hygiene declaration form is to be completed and shown if requested.

Unless necessary only established tracks are to be used within the Project Area.

4.3.2 Signage

Signage should be erected and displayed prominently at all site access points clearly stipulating contact details and access requirements (such as check in at site office, do not enter without prior approval, use washdown facilities to clean vehicles and machinery).

4.4 Vehicle Hygiene

Vehicles and machinery should be free of weed seed and visible mud and dirt when entering the Project Area. Before entering the Project Area, a vehicle hygiene declaration is to be completed (see Appendix A). Good weed hygiene supports weed control efforts and can prevent weed spread.

As equipment, machinery and vehicles entering the Project Area will vary considerably, this procedure cannot be 100% tailored to each vehicle entering. However, the general procedure will outline the steps and outcomes required.

Identify a suitable washdown facility. A washdown facility is an area where employees, contractors and visitors can clean all vehicles and machinery entering or leaving the Project Area. Vehicles can be washed in a public car wash or at depots prior to commencing travel to site.

It is recommended a washdown facility or area is installed in the Project Area.

General Procedure:

Conduct a walk around of the vehicle or equipment to be cleaned.

Assess extent and identify areas of the vehicle that may trap or hide dirt, mud, and seeds. (Wheel guards, protective plates, etc).

Thoroughly clean with high pressure water or air (as necessary) the underbody of vehicle, moving on to the body.

Avoid recontamination of the vehicle when exiting washdown area.

Conduct a final inspection to ensure vehicle hygiene is adequate.

Complete vehicle hygiene declaration form and keep in vehicle.

It is the responsibility of the driver or operator of vehicles and machinery entering the Project Area to ensure that the vehicle is clean and free of plant material to an acceptable standard and that the vehicle hygiene declaration has been completed.

 **VISITORS**

A Biosecurity Management Plan (the Plan) applies to this place. Failure to comply with the Plan may be an offence
NSW Biosecurity Act 2015.

**PLEASE RESPECT
FARM BIOSECURITY**

Please phone or visit the office before entering to obtain a copy of the Plan or to discuss your obligations.



DO NOT ENTER WITHOUT PRIOR APPROVAL
Vehicles, people and equipment may carry
weed seeds, pests and diseases

4.5 Record Keeping

Record keeping will be utilised and maintained throughout the life of the Project to ensure and demonstrate compliance with the *Biosecurity Act 2015* and the General Biosecurity Duty.

Record keeping activities include the following:

- Washdown logs for vehicles, machinery and equipment, including vehicle hygiene declaration forms;
- Records of monitoring or surveys completed;
- Induction and training records;
- Incident reports;
- Non-compliance reports; and
- Records of weed control activities (Chemical application records).

4.6 Targeted Weed Management

Ecological surveys within the Project Area have identified the presence of the exotic plant species shown in Table 3-4. These surveys verified the presence of three significant species, all classified as Weeds on National Significance and Central Tablelands regional priority weeds:

- Blackberry (*Rubus fruticosus*);
- African Boxthorn (*Lycium ferocissium*); and
- Serrated tussock (*Nassella trichotoma*).

These weeds will be targeted species managed under the biosecurity risk management program to ensure compliance with the *Biosecurity Act 2015* and the General Biosecurity Duty. The targeted species list will be reviewed upon any sightings and results from the monitoring program and any additional weed surveys. Factsheets detailing recommended management strategies is included in Appendix B.

The management of other introduced plant species, such as those not listed as WoNS or priority species will include practices to ensure dispersal of seeds and undesirable plant matter is minimised. An integrated weed management strategy should be implemented to ensure the control of weed species incursions.

The monitoring program will serve to provide verifiable justification on the success rate of the adopted control strategy and recognise areas in need of modification or actions required.

Weed control techniques which may be employed to manage populations of targeted weed species are summarised below in Section 0.

4.6.1 Weed Management Techniques

Mechanical

Mechanical control involves the use of powered tools and machinery to control weed infestations. It is suitable for larger infestations because it reduces the weed densities with less time and manual effort. Disturbance of the soil can increase the likelihood of weed seed germination, requiring follow up herbicide treatment and monitoring. Specific mechanical control techniques include:

- Slashing;
- Mowing;
- Hand removal; and
- Grubbing or chipping.

Reproductive material of plants not removed such as roots and seeds can result in regeneration or new germination of the targeted weed species, because of this follow up treatment is necessary and mechanical techniques should be used selectively to ensure weed spread is minimised.

If mechanical removal is employed, care should be taken to minimise soil disturbance and the spread of weed seeds from machinery as much as reasonably possible. Vehicle hygiene should be maintained in accordance with this Biosecurity Risk Management Plan.

Chemical

Chemical control involves the use of herbicides. In certain circumstances the use of herbicides offers an economical, practical and selective method of managing certain weeds. In many cases, a weed is only responsive specific herbicides, therefore it is important to use the correct product and application rate for control and is applied by an experienced contractor/operator.

Under the *Pesticides Act 1999* and Regulation 2009, all pesticide users in NSW must:

- Only use pesticides registered or permitted by the APVMA;
- Obtain an APVMA permit if they wish to use a pesticide in a way not covered by the label;
- Read the approved label and/or APVMA permit for the pesticide product (or have the label/permit read to them) and strictly follow the directions on the label;
- Only keep registered pesticides in containers bearing an approved label;
- Prevent injury to people, damage to property and harm to non-target plants and animals, the environment and trade through the use of a pesticide;
- Undertake approved training in pesticide application and renew this qualification every 5 years; and
- Keep records of their pesticide application.

Specific application techniques for chemical control include:

- Foliar spraying;
- Ground boom spray application;
- Cut, scrape and paint;
- Stem injection;
- Basal bark; and
- Pellet or granular application.

Herbicide application should be undertaken when the plant is actively growing, typically in the warmer months. Where a plant is displaying signs of stress other techniques such as manual or mechanical removal should be utilised.

4.7 Pest Animal Management

Initial opportunistic fauna surveys of the Project Area identified the presence of the pest animals shown in Table 3-5. All the priority species recorded within the Project Area fall under the Asset Based Protection management category, the aim of which is to reduce the impact of widespread pest animals on key assets with high economic, environmental and social value.

The five priority pest animal species identified are the targeted species which are to be managed under this Biosecurity Risk Management Plan, to ensure compliance against the general biosecurity duty.

A monitoring program will be put in place (Section 0) to record and understand pest animal levels and movements within the Project Area. The targeted species list will be reviewed upon any sightings and results from the monitoring program.

Specific pest animal control actions such as baiting, trapping and shooting fall outside of the scope of this Biosecurity Risk Management Plan, however **exclusion fencing should be installed where suitable and possible**. Regular fence inspections will fall under the monitoring program.

4.7.1 Wild Dog

In NSW, the term 'wild dog' refers to all wild-living dogs (*Canis familiaris*) and includes dingoes, feral domestic dogs, and the hybrid descendants of these. The primary focus of wild dog management is reducing the negative impacts of wild dogs on livestock across the region. Wild dog impacts have been recorded across half of the Central Tablelands. The NSW Wild Dog Management Strategy 2022-2027 guides specific actions to reduce the negative impacts of wild dogs more effectively.

As outlined within the Central Tablelands Regional Strategic Pest Animal Management Plan, control methods for wild dogs include baiting (ground and aerial application), trapping, shooting and exclusion fencing. These control measures do not form part of this biosecurity risk management plan at this stage and the focus is on **asset protection through exclusion fencing only**.

While no one land manager can be solely responsible for wild dog control, it is expected that Paling Yards Development Pty Ltd will support and be involved in regional/local wild dog management programs if requested. This may include additional control measures including baiting.

Any wild dog sighting or signs will be recorded and reported in accordance with the monitoring program.

4.7.2 European Red Fox

European red foxes attack small livestock and native animals and spread weeds.

As outlined within the Central Tablelands Regional Strategic Pest Animal Management Plan, control methods for European red foxes include baiting, trapping, shooting, exclusion fencing and harbour destruction. These control measures do not form part of this biosecurity risk management plan at this stage and **the focus is on asset protection through exclusion fencing only**.

It is expected that Paling Yards Development Pty Ltd will support and be involved in strategic red fox management programs if requested. This may include additional control measures including baiting or shooting.

Any European red fox sightings or signs will be recorded and reported in accordance with the monitoring program.

4.7.3 Fallow Deer

Fallow deer are a small deer species that tends to herd and stay closer to more open areas. They are the most widespread deer species in the Central Tablelands region. All deer species compete with livestock for pastures, can significantly impact on crops and have environmental impacts on shrubs and trees.

As outlined within the Central Tablelands Regional Strategic Pest Animal Management Plan, shooting remains the only control tool for wild deer. This control measure does not form part of this biosecurity risk management plan at this stage and **the focus is on asset protection through exclusion fencing**.

It is expected that Paling Yards Development Pty Ltd will support and be involved in strategic fallow deer management programs if requested. Any fallow deer sightings or signs will be recorded and reported in accordance with the monitoring program.

4.7.4 Rabbit

Rabbits occupy a wide range of habitats, including native and modified grasslands, woodlands and urban environments. Rabbits can majorly impact grazing, including grazing lands and native flora.

As outlined within the Central Tablelands Regional Strategic Pest Animal Management Plan control methods for wild rabbits include baiting, biological control, harbour destruction, trapping, shooting and exclusion fencing. These control measures do not form part of this biosecurity risk management plan at this stage and **the focus is on asset protection through exclusion fencing only.**

It is expected that Paling Yards Development Pty Ltd will support and be involved in strategic wild rabbit management programs if requested. This may include additional control measures including baiting or shooting.

Any rabbit sighting or signs will be recorded and reported in accordance with the monitoring program.

4.7.5 Myna

Mynas can negatively impact on native bird species and fruit production. Indian myna usurp¹ native bird nests and hollows, killing the young and eggs.

As outlined within the Central Tablelands Regional Strategic Pest Animal Management Plan control methods for Indian mynas include trapping, shooting, netting and scare guns

It is expected that Paling Yards Development Pty Ltd will support and be involved in strategic wild Indian myna management programs if requested. This may include additional control measures including trapping or shooting.

Any Indian myna sighting or signs will be recorded and reported in accordance with the monitoring program.

¹ Nest usurpation is when one species takes over the nest of another species.

5. MONITORING PROGRAM

A detailed weed and pest assessment should be undertaken prior to construction to establish a baseline dataset and detailed mapping. This would be appended to this Biosecurity Risk Management Plan and will form the basis of the recommended monitoring program.

Regular monitoring of the Project Area for signs of pest animals will be undertaken to determine whether additional pest management measures are required and should be undertaken. Fencing will be inspected in conjunction with a regular inspection schedule to ensure there is no fencing damage and for potential entry points for pest animals.

Evidence of any pest animals within the Project Area and surrounding areas will be reported.

Including:

- Pest animal sightings;
- Pest animal signs (digging by feral pigs);
- Pest animal habitat (rabbit warrens); and
- Damage to the pest exclusion fencing.

If pest animal levels or use appear to be increasing a species-specific monitoring strategy should be put into place. If determined to require targeted management strategies, a species-specific management and monitoring plan should be developed and utilised.

Regular monitoring of the Project Area for signs of weeds will be undertaken to determine whether additional weed management measures are required and should be undertaken. Weed surveys should be undertaken at regular intervals across the Project Area (every 3 months during construction and annually during operation of the windfarm). These inspections should occur more frequently in areas where weed management has occurred or alongside commonly trafficked areas such as tracks, entry points, washdown facilities and designated parking areas.

If any additional priority weeds or areas of infestation are recorded, a species-specific management plan should be developed and utilised.

5.1 Response to Biosecurity Incident or Risk

Biosecurity matters detected within the Project Area, during surveys or during the course of standard activities, will be reported and investigated in accordance with the Monitoring Program as outlined below.

If a suspected prohibited matter pest or disease of animals occurs (schedule 2 of *Biosecurity Act 2015* and Table 3-4), it must be immediately reported. Phone Local Land Services on 1300 795 299 (during business hours), call the NSW DPI Biosecurity helpline **1800 680 244** or use the online form at <https://forms.bfs.dpi.nsw.gov.au/forms/9247>.

The following information must be supplied:

- Full name and contact phone number;
- The suspected pest or disease you are reporting;
- The location of the suspected pest or disease (including any relevant property identification code);
- Details of any significant biosecurity impact; and
- Any other information requested by the person or body to whom the notification is required to be given.

5.2 Success Criteria

Criteria for success for the Biosecurity Risk Management Plan that will be assessed throughout the Project:

- No pest animal or plant species population will increase throughout the Project;
- No introduction of significant/priority biosecurity matter; and
- Weed species populations will reduce within the Project Area.

6. REFERENCES

- Corporate Research Centre for Weed Management . (2002). *Best Practice Management Guide*.
- Department of Agriculture and Water Resources. (2017). *Australian Weeds Strategy 2017-2027*. Commonwealth of Australia.
- Department of Primary Industries. (2009). *Guidelines for Monitoring Weed Control and Recovery of Native Vegetation*.
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- Department of Primary Industries. (2019). *NSW WeedWise*. Retrieved from <https://weeds.dpi.nsw.gov.au/Weeds/>
- Farmbiosecurity. (n.d.). *Farm Biosecurity*. Retrieved from <https://www.farmbiosecurity.com.au/essentials-toolkit/people-vehicles-equipment/>
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- NSW Government. (2022). *Biosecurity Act 2015*.
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- Sonia Graham, N. J. (2016). *Weed Hygiene Practices in NSW: Knowledge and practices of landholders, public land managers, weed contractors and agricultural transport operators* . University of Wollongong.
- Whitsunday Regional Council. (2021). *Weed Washdown Strategy*.

APPENDIX A WEED HYGIENE DECLARATION FORM

Weed hygiene declaration

Part 1: Sale or supply of things

(Examples of 'things' include fodder, grain, seed, livestock, gravel, sand, soil, mulch, packing material, machinery, vehicles or water)

This declaration is valid for supplying the thing/things specified below from to (please provide dates)

1. Thing (please tick the relevant box and provide a brief description)

Fodder Grain/seeds Sand/gravel Machinery Mulch Livestock Other

Amount
(e.g. weight, size of load, number of items)

Description
(e.g. cattle, hay, dozer)

2. Has the thing been moved through, stored in, come from, or used in a place infested with:

	Yes	No	Maybe
Parthenium			
Giant rat's tail grass, American rat's tail grass, giant Parramatta grass, Parramatta grass			
Prickly acacia			
Other (provide details)			

3. If you answered 'yes' or 'maybe' in question 2, then what actions have been taken to remove or ensure that there is no weed reproductive material*? (please tick the relevant boxes and specify steps taken)

*Please refer to the definition of 'weed reproductive material' in the explanatory notes.

Nil Washing/cleaning Quarantine period Chemical treatment Certified clean Other

Steps taken

4. To the best of my knowledge the thing described above still contains a weed listed in question 2 above.

Yes	No	Maybe

I, of

town state telephone

declare that the information that I have provided in this declaration is true and correct and I have read the accompanying explanatory notes before completing this declaration.

Signature Date

Part 2: Transport of contaminated things

(Vehicle' includes anything used for carrying any thing or any person by land, water or air, and includes equipment or machinery capable of moving on land)

This declaration is valid for transport and movement of vehicles and other things from to (please provide locations)

1. Movement of vehicles—The vehicle described as: make

registration no. or engine/frame no. was clean* prior to entry to (destination)

*Please refer to the definition of 'clean' in the explanatory notes.

2. Transport of contaminated things—If you are transporting anything contaminated or possibly contaminated with any declared weed, what actions are being used to contain the weed reproductive material?

Nil Covered with tarpaulin Enclosed within container Chemically treated Other

Actions:

I,* of

town state telephone

*If same as Part 1 please write 'as above'

declare that the information that I have provided in this declaration is true and correct and I have read the accompanying explanatory notes before completing this declaration.

Signature Date

Explanatory notes

This declaration was developed in response to landholders, rural industry, community and government desire to minimise the impact of weeds on their business and on the environment. It has been developed to assist in preventing the spread of weeds and other contaminants, and to meet the requirements of section 45 of the *Land Protection (Pest and Stock Route Management) Act 2002*. A completed declaration provides information on the status of a 'thing', whether it is contaminated or free of weedy material. 'Part 1: Sale or supply of things' of the declaration should be completed by the supplier then given to the receiver before they receive the thing. The receiver can then make an informed decision and take precautions to prevent new infestations. It can also provide written assurance that a vehicle is clean before entering a property.

Why use this declaration?

This declaration can provide:

- a supplier with a way of meeting the requirements of section 45 (2) of the Act, if they are supplying any thing that is or could be contaminated with the weeds listed below
- a person obtaining a thing with information on whether the thing is clean of weed reproductive material or has been infested
- assurance that a vehicle was clean* prior to entry onto a property
- assurance that any contaminated or potentially contaminated thing is being moved so as not to spread the contaminant
- assurance that a product is free of other weedy reproductive material.

Section 45 of the Act makes it an offence to supply a thing that is contaminated with a Class 1 weed or any of the Class 2 weeds listed below. However, for the Class 2 weeds, a person does not breach section 45 if they provide a written notice (Part 1 of this declaration) that states that the thing is or may be contaminated. The written notice must be filled and given to the receiver before the thing is supplied.

List of Class 2 species

The following Class 2 pests are prescribed in section 45(1)(b) of the Act. These weeds are readily able to infest a wide range of products, from livestock to grain and vehicles. These weeds have a major effect on pasture production and have the capacity to invade large areas of Queensland.

Common name	Species
American rat's tail grass	<i>Sporobolus jacquemontii</i>
Giant Parramatta grass	<i>Sporobolus fertilis</i>
Giant rat's tail grass	<i>Sporobolus pyramidalis</i> and <i>S. natalensis</i>
Parramatta grass	<i>Sporobolus africanus</i>
Parthenium	<i>Parthenium hysterophorus</i>
Prickly acacia	<i>Acacia nilotica</i>

Across Queensland, isolated outbreaks of declared plants such as those listed above are found on properties and roadsides each year. Outbreaks of these declared plants are often located hundreds of kilometres from core infestations. These outbreaks occur as a result of machinery, livestock, vehicles, fodder, grain, material and equipment contaminated with weed seeds being transported across the state. A high percentage of seed from prickly acacia and giant rats tail grass remains viable after being eaten and excreted by cattle.

*Definitions

Clean:

- For vehicles, machinery and equipment, clean means that no soil and/or organic matter that may contain weed reproductive material is on or in areas that are accessible during cleaning and maintenance work. A checklist and guidelines that show areas that are required to be clean are available at www.biosecurity.qld.gov.au
- A vehicle is considered to remain clean if it leaves its point of origin clean and only travels on sealed roads or well-maintained unsealed roads.
- For livestock, clean means that animals are internally and externally free of the reproductive material of any declared plant listed in the Land Protection (Pest and Stock Route Management) Regulation 2003. If livestock are suspected to be infested with a declared weed, then they should be quarantined within a weed-free paddock or pen for a 14-day period.

Weed reproductive material means any part of the plant that is capable of producing another plant by sexual or asexual reproduction. Examples include seeds, bulbs, rhizomes, tuber, stem or leaf cutting and the whole plant.

Well-maintained unsealed road means roads that do not have vegetation growing on or encroaching onto the area occupied by traffic.

For further information, please contact Biosecurity Queensland on 13 25 23.



APPENDIX B FACTSHEETS

African boxthorn

PJ Gray
EMK Joshua
AC McCaffery

Introduction

African boxthorn (*Lycium ferocissimum*) is a member of the family Solanaceae, which also includes silver-leaf nightshade, tobacco and tomatoes.

It was introduced into Australia from South Africa in the mid 1800s and was commonly used as a hedge plant.

It is now a serious weed threat in all States and is one of the major weed threats to the semi-arid rangelands of western NSW.

Consequently, it is a declared noxious weed in most parts of NSW (see map).

The problem

African boxthorn is an aggressive invader of pastures, roadsides, reserves, remnant bushland and waterways. It forms an impenetrable, spiny thicket that inhibits the movement of stock and provides a haven for feral animals.

Many insects, including fruit fly, the common house fly and the tomato fly, breed in the fruit of this weed.



A close up of a mature African boxthorn shrub. Note the fleshy leaves, immature fruit (green berries), mature fruits (red berries) and spines at the end of the branchlets.

Distribution

In NSW, African boxthorn is more prevalent on the well drained soils of the slopes and plains. Often, it has spread from around old homesteads and urban areas. It grows on all soil types but establishes best on lighter soils, particularly along dry creek beds.

The plant

African boxthorn is an erect perennial shrub. It can grow up to 5 m high and 3 m across but usually reaches only 2 or 3 m in height. It is characterised by its woody, thorny growth. The stems are rigid and very branched, and the main stems have spines up to 15 cm long. Each smaller spiny branchlet ends in a stout spine.

The leaves are smooth, fleshy and up to 3.5 cm long. They can be larger and more succulent on regrowth from damaged roots. The plant is drought resistant and in times of moisture stress can shed its leaves, making it look dead. In some locations plants can be deciduous, losing their leaves in winter.



An African boxthorn infestation. Commonly found under trees because the seeds remain viable when excreted by birds. Photos: Brian Worboys, Maitland City Council.

Plants are at least two years old when they flower, and although this generally occurs in spring and early summer it may occur at any time of the year provided the conditions are right. The flowers are white with pale blue markings and fragrant. They have five petals.

Fruit set generally occurs in autumn, but, again, it can occur at any time of the year depending on conditions.

The berries are green when young and succulent, round, 5 to 10 mm in diameter, contain 35 to 70 seeds and are orange-red when ripe. Seeds can germinate at any time of the year if there is adequate moisture and warmth.

The plant has an extensive, deep, branched taproot that will sucker and produce new growth if broken. Early root growth is rapid to allow seedlings to compete with other plants.

Dispersal

The seeds are readily eaten by birds and animals and remain viable when excreted. Consequently,

new infestations are commonly found under trees, along fences and under powerlines. Spread can also occur if seeds contaminate agricultural produce, gravel or mud. The roots also have the ability to produce new growth from broken pieces, so care must be taken in removing and destroying all root matter when undertaking mechanical control.

Methods of control

The effective, long-term control of this weed will generally require the integration of a number of techniques, including mechanical removal, cultivation, herbicide application, replacement with appropriate plants and regular monitoring.

For invasive woody weeds such as African boxthorn, control is more effective and economical if done when the plants are young.

The control methods used will depend on the infestation size and location. For advice on the most appropriate methods for your situation, consult your local agronomist or council weeds officer.



Areas of NSW where African boxthorn is declared a noxious weed. Alan Maguire, 2007.

Mechanical removal

The most cost effective way of controlling mature bushes forming thickets is to physically remove the top growth and as many of the roots as possible. The removed plant material should then be burnt. Removal of the roots is much easier and more effective when the soil is moist.

It is important to destroy all plant material after physical removal because:

- dead branches still pose a problem because of their thorns and the fact that they can harbour vermin;
- unripened fruit on cut branches can still ripen and produce seed; and
- broken root fragments may sucker and produce new growth.

Cultivation

After physical removal of the mature plants, suitable sites can be deep ripped, bringing most remaining root fragments to the surface to be raked and burned. In some instances cultivation may result in the deeper root fragments shooting.

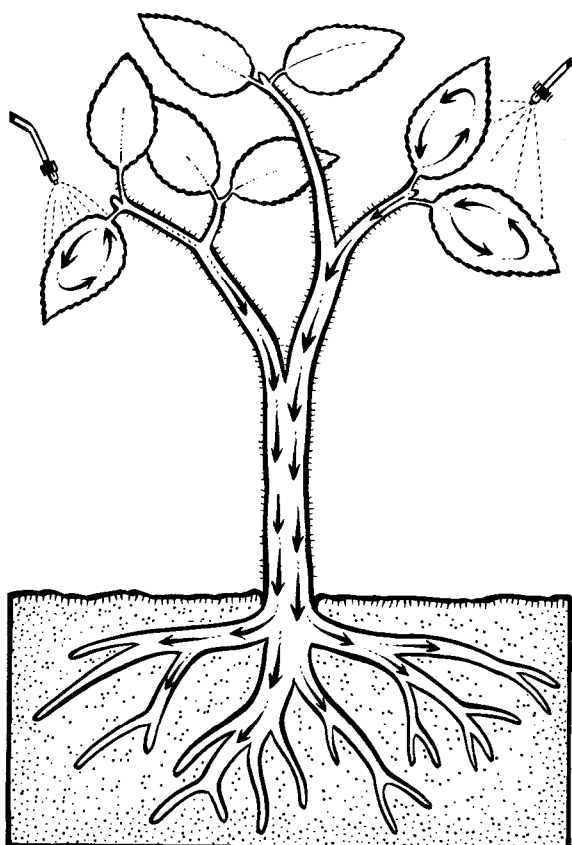


Figure 1: Applying chemicals through foliar spraying is more effective if the plant is actively growing. Queensland Natural Resources and Mines.

In this case, follow-up treatment will need to be directed at the regrowth. It is essential that you perform follow-up treatment as new plants become established.

Do not treat regrowth with a foliar herbicide until the plants are at least 50 cm high (approximately 18 months old).

Chemical control

Only a registered herbicide used according to the directions on the label should be used to control this weed. Refer to the Department of NSW DPI publication *Noxious and Environmental Weed Control Handbook* for the chemicals recommended for the control of African boxthorn.

Herbicides can be applied to African boxthorn in many different ways. At times, the plant will lose its leaves and appear dead after the application of a herbicide, but later new leaves appear and the plant appears to recover. This cycle may happen several times before the plant eventually dies. The most appropriate form of herbicide application will depend on the location, size and maturity of the infestation.

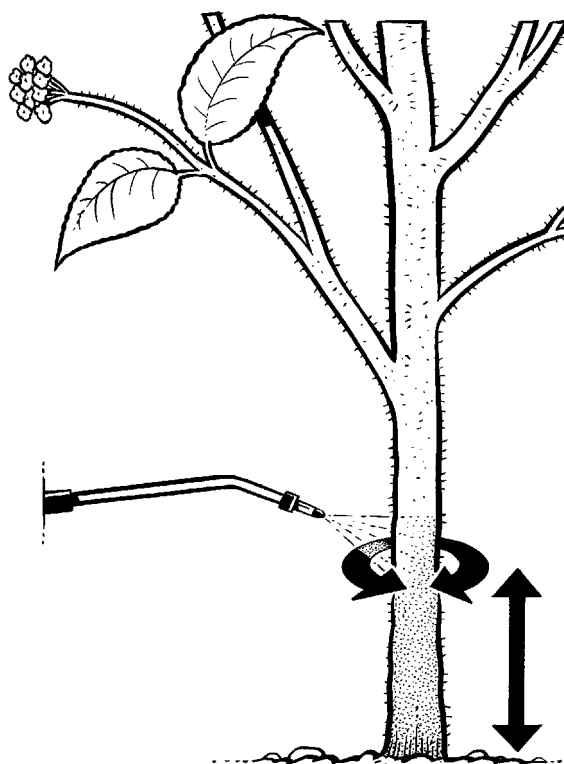


Figure 2: Basel bark application of chemicals should be around the complete base of every stem to a height of 30–40cm above the ground. Queensland Natural Resources and Mines.

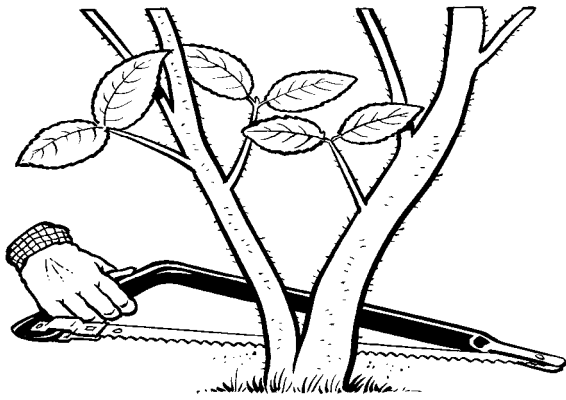


Figure 3. In cut stump applications it is important to apply the chemical immediately to the cut stem. Queensland Natural Resources and Mines.

Foliar spray

Foliar spraying is the most commonly used method of control. Its effectiveness depends on adequate soil moisture to allow active growth of the bush. For effective control by this application method, spray the whole bush thoroughly during a time when the plant is actively growing (Figure 1). This will vary depending on the location but is generally during spring after rain. For large bushes it is very costly and difficult to obtain good coverage with the herbicide. It may be more cost effective to bulldoze thickets of large bushes and spray the regrowth. The uptake of foliar-applied herbicides is dependent on total leaf area, so foliar spraying should not be done until the regrowth is at least 50 cm high (approximately 18 months old). For effective results, do not treat infestations during hot, dry, summer periods or when the plant is stressed from drought, water logging or cold.

Basal bark treatment

This technique is appropriate for infestations in environmentally sensitive locations. It is most suited for small bushes with stem diameters up to 5 cm. Spray a herbicide registered for this activity around the complete base of every stem to a height of 30 to 40 cm above the soil surface (Figure 2).

Cut stump treatment

This technique is also appropriate for small infestations in environmentally sensitive locations. It is most suitable for large plants with stem diameters greater than 5 cm.

Cut each stem off 15 cm above the soil surface. Liberally apply a herbicide registered for this activity to the cut surface within 30 seconds of the cut being made (Figure 3). This can be done by paintbrush or by spraying. If the herbicide is not applied immediately, the plant will heal the cut, the

chemical will not be translocated through the plant, and control will not be effective.

Root application

Take great care when using this technique.

Many desirable trees, in particular eucalypts, are susceptible to the residual herbicides used for this control method. Do not use these chemicals within a distance of at least twice the height of adjacent desirable trees or shrubs.

To control African boxthorn, apply an appropriate registered residual herbicide directly under the plant towards the edge of the foliage (drip line). The herbicide should preferably be applied under the soil to prevent degradation by sunlight and possible contamination of surface run-off after rain. It is most effectively applied when the soil is moist—usually in spring or autumn.

These herbicides have the advantage of being easy to apply, and the timing of the application is not as critical as for other application methods. The residual effect of these herbicides may also give control of seedling regrowth for some time after application.

Replacement with appropriate plants

Like most weeds, African boxthorn seedlings are susceptible to competition from other plants. It is essential for the long-term control of this weed that, once removed, it is replaced with other suitable vegetation.

The vegetation you use will depend on your site. It can include the establishment of native vegetation or perennial pastures.

Native vegetation

If the weed infestation is providing a valuable habitat for native fauna, use a staged control program. This

will allow the gradual replacement of the weed habitat with suitable indigenous vegetation. Consult a local vegetation expert for advice on suitable local species and their establishment and management.

Pastures

Vigorous perennial pastures provide competition to prevent the invasion of African boxthorn. At suitable sites they should be established as soon as possible after the removal of the weed infestation but not after the application of residual herbicides. Consult your local agronomist for advice on pasture establishment and appropriate pasture management. For further information refer to the range of publications available at any NSW DPI office or at www.dpi.nsw.gov.au

Regular monitoring

All control methods will require follow up treatment for long-term management of African boxthorn. Once the initial infestation is removed, regular monitoring of the site for regrowth from root fragments or germinating seedlings should be carried out. Control of these small plants is easy if you use cultivation or apply an appropriate registered herbicide.

Who is responsible?

African boxthorn is a declared noxious weed in many areas of NSW. See www.dpi.nsw.gov.au/weeds for a complete list of declared noxious weeds for each control area.

African boxthorn has been declared as a Class 4 weed in NSW. A Class 4 weed poses a threat to agriculture, the environment or the community and has the ability to spread to other areas. The growth of the plant must be managed in a manner that reduces its numbers, spread and incidence, and continuously inhibits its reproduction.

The *Noxious Weeds Act 1993* is enforced by the local control authority (usually local government). The responsibility for control of noxious plants and appropriate disposal of weed plant material on private land rests with the owner or occupier of the land. Failure to do so could result in the local control authority issuing a weed control notice, a fine or taking court action.

Local control authorities must adequately control noxious weeds on land under their control to prevent the infestation of adjoining land. The community can help control this weed by notifying the local control authority of any known infestation of African boxthorn on public land.

Further information

For further information on the management of African boxthorn contact your local council Weeds Officer or NSW DPI District Agronomist.

Publications available

For a complete list of NSW DPI publications, please see www.dpi.nsw.gov.au, or contact the NSW DPI Bookshop on 1800 028 374 or by emailing bookshop@dpi.nsw.gov.au.

Acknowledgements

Information for this Primefact was taken from:

African boxthorn Agfact P7.6.31, first edn

WT Parsons and EG Cuthbertson 2001, *Noxious weeds of Australia*, second edn, CSIRO Publishing, Collingwood, Melbourne.

African boxthorn (Lycium ferocissimum) 2002, DPIWE Information sheet, Department of Primary Industries, Water and Environment, Tasmania or www.dpiwe.tas.gov.au/inter.nsf/WebPages/RPIO-523VU9

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Always read the label

Users of agricultural or veterinary chemical products must always read the label and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this publication.

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Department of
Primary Industries

Blackberry

Rubus fruticosus species aggregate



Blackberry fruit are red and dark purple (Photo: Courtesy QDNRM)

- Also known as: black berry, blackberries, black berries
- This plant is a Weed of National Significance
- This plant must not be sold anywhere in NSW

Profile

How does this weed affect you?

Blackberry has already cost around \$100 million to control and in lost production. It:

- quickly infests large areas
- forms dense thickets that restrict:
 - stock access to waterways
 - access via fire trails
- takes over pastures
- is unpalatable to most livestock
- reduces native habitat for plants and animals
- fuels bushfires
- provides shelter for rabbits and foxes

- provides food for introduced species such as starlings, blackbirds and foxes.

Blackberry can have some positives such as:

- edible fruit
- supporting pollinators
- food and shelter for some native animals and birds such as bandicoots and blue wrens
- leaves can be used in herbal medicines.

The *Rubus fruticosus* aggregate

There are lots of different blackberry species. In NSW, the European blackberry (*Rubus fruticosus*) is most common. *Rubus fruticosus* is the collective name for different European blackberry species. Nine species occur in NSW:

- *Rubus anglocandicans*
- *Rubus leucostachys*
- *Rubus polyanthemus*
- *Rubus laciniatus*
- *Rubus ulmifolius* var. *ulmifolius* and var. *anoplothysus*
- *Rubus vestitus*
- *Rubus leightonii*
- *Rubus phaeocarpus*

This weed profile is about the *Rubus fruticosus* species in NSW.

What does it look like?

Blackberry is a shrub with tangled, prickly stems. It can be hard to tell different *Rubus* species apart. Contact your local weeds officer for advice on identification.

Leaves are:

- alternate along the stem
- in clusters of 3 - 5 leaves
- dark green on leaf tops
- lighter green on the underside of leaves
- covered in short, curved prickles
- absent in winter in cooler climates.

Stems are:

- called 'canes'
- up to 7 m long
- vertical, arched or growing along the ground
- covered in sharp prickles (except for *Rubus ulmifolius* var. *anoplothysus*)
- green, purplish or red depending on how much light they get.

Flowers are:

- white or pink
- 2 – 3 cm in diameter
- clustered in a cylinder or pyramid shape
- on the end of canes
- showing from late November to late February.

Fruit are:

- dark coloured berries
- with each berry having 20 – 30 seeds.

Roots are:

- woody
- perennial
- in a crown up to 20 cm wide
- with a main root up to 4 m deep
- with secondary roots that grow horizontally from the crown for 30 – 60 cm, then downwards with thin roots.

Similar looking plants

There are other introduced *Rubus* species that are not part of the *Rubus fruticosus* group:

- *Rubus laudatus*
- *Rubus philadelphicus*
- *Rubus roribaccus* (dewberry, youngberry, boysenberry)
- *Rubus loganobaccus* (loganberry)
- *Rubus ellipticus* (yellow Himalayan raspberry)
- *Rubus rugosus* (keriberry)
- *Rubus niveus*
- *Rubus idaeus* (raspberry).

There are also native *Rubus* species that are not part of the *Rubus fruticosus* group. The native *Rubus pavifolius* is often found growing in association with the *Rubus fruticosus* group.

Where is it found?

Blackberry infests about 9 million hectares of land in Australia. The *Rubus fruticosus* species in NSW grow in different areas:

- *Rubus anglocandicans* is the most common species in wetter areas of the state
- *Rubus leucostachys* is widespread
- *Rubus polyanthemus* is in Kosciuzsko National Park
- *Rubus laciniatus* is in wetter areas of the state
- *Rubus ulmifolius* var. *ulmifolius* is widespread
- *Rubus ulmifolius* var. *anoplothyrsus* may be present in NSW
- *Rubus vestitus* is uncommon
- *Rubus leightonii* is uncommon
- *Rubus phaeocarpus* grows in the Kowmung River area.

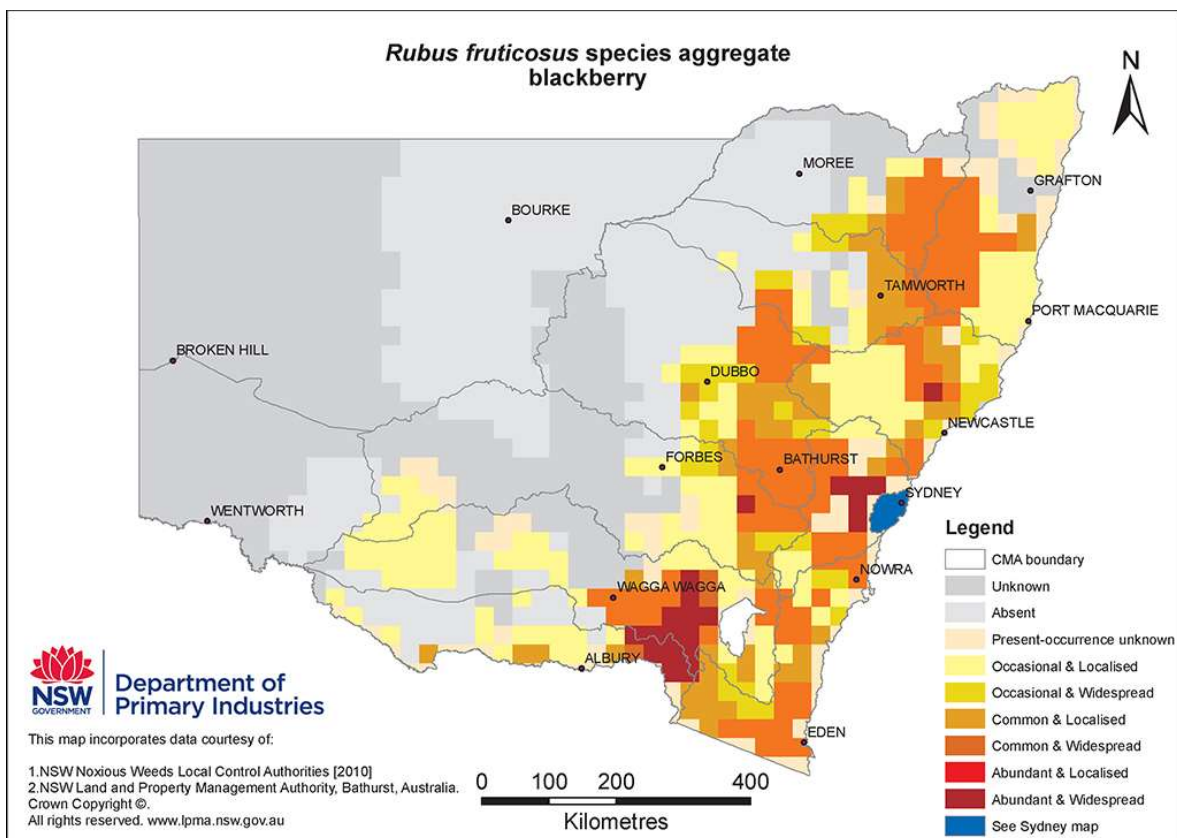
What type of environment does it grow in?

Blackberry likes:

- temperate climate with a warm summer and cool winter
- annual rainfall of at least 700 mm.

Blackberry can grow in drier climates if it has access to water e.g. along a riverbank. It does not like heavy shade.

Distribution map



How does it spread?

Seeds

Blackberry produces a lot of seeds. There can be up to 13,000 seeds per square metre under a blackberry bush at the end of a fruiting season. Birds and animals feeding on the berries spread the seeds in their droppings. Seeds also spread by water and with soil.

Vegetatively

When first year canes (primocanes) touch the ground, they sprout roots and become new 'daughter' plants. The next year, primocanes produce short canes with flowers and berries on the end.

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NSW Department of Primary Industries Weed Management Unit (2009). *Blackberry Control Manual: Management and control options for blackberry (Rubus spp.) in Australia*. Department of Primary Industries, Victoria.

Page, A. R., & Lacey, K. L. (2006). Economic impact assessment of Australian weed biological control. CRC for Australian Weed Management.

More information

- Blackberry control on organic farms (web archive) (http://archive.dpi.nsw.gov.au/__data/assets/pdf_file/0019/415900/blackberry-control-organic-farms.pdf)
- NSW Weed Risk Assessment (<https://www.dpi.nsw.gov.au/biosecurity/weeds/strategy/nsw-weed-risk-management-system/wrm-system/blackberry>)
- Weed Control Using Goats: a guide to using goats for weed control in pastures (<https://www.mla.com.au/CustomControls/PaymentGateway/ViewFile.aspx?Zcbi/sJXSGJLaSmLwP47791jSfV+NqLTfYp7HOx/1BjWgU7vSJm2Y5IZA2bygFt3EYMKKAfsht7d1Tnt3BqIA==>)

Control

Long term control of blackberry is an ongoing process. A combination of control methods and follow up is needed.

Physical removal

Physical control alone is rarely successful because it's hard to remove all the roots. Cultivation often spreads blackberry further. Slashing can help make access through infestations, but promotes regrowth. After slashing, use a follow-up control.

Biological control

The leaf rust fungus *Phragmidium violaceum* is the only deliberately released biological control agent in Australia. It attacks the leaves, and infects flower buds and unripe fruit and stops blackberry producing daughter plants.

Phragmidium violaceum spores need dew, rain or high humidity to germinate. It is most effective when:

- most of the plant's canopy is young leaves
- annual rainfall is greater than 750 mm
- rainfall is evenly spread over the year,
- January temperatures average about 20°C.

Eight different fungus strains of *Phragmidium violaceum* were released in 2000.

Pasture management

Strong, actively growing pastures help prevent blackberry invasion.

Grazing

Goats can make a start on controlling heavy infestations. Goats prefer blackberry over improved pasture species.

Cattle will not control blackberry infestations but can stop daughter plants from establishing.

Sheep may graze blackberry seedlings if there is no other palatable feed around.

Burning

Burning will not kill blackberry. Burning can make infestations more accessible for follow-up treatment.

Chemical control

Herbicides are the most reliable blackberry control method. Use herbicides in combination with other control methods.

There are many herbicides registered for use on blackberry. A mixture of triclopyr + picloram used with or without aminopyralid gives the best long-term control.

Spray healthy, actively growing plants with new leaves on the cane tips. Apply to both the outer and inner leaves.

First year plants are easier to kill with herbicide. Well-established thickets may need more treatments.

After slashing or burning, wait until plants have up to 1 m of regrowth before applying herbicide.

Some blackberry species are more resistant to certain herbicides than others. Identify the species before choosing a herbicide.

Herbicide options

WARNING - ALWAYS READ THE LABEL

Users of agricultural or veterinary chemical products must always read the label and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any statement made or not made in this information. To view permits or product labels go to the Australian Pesticides and Veterinary Medicines Authority website www.apvma.gov.au

See Using herbicides (<http://www.dpi.nsw.gov.au/biosecurity/weeds/weed-control>) for more information.

Glyphosate 360 g/L (Various products)

Rate: 10–13 mL per 1 L of water

Comments: Flowering to leaf fall. Use higher rate on old, dense infestations.

Withholding period: Nil.

Herbicide group: M, Inhibitors of EPSP synthase

Resistance risk: Moderate

Hexazinone 250 g/L (Velpar® L)

Rate: Undiluted (4 mL per spot)

Comments: Bushes up to 1 m in height.

Withholding period: No stated withholding period.

Herbicide group: C, Inhibitors of photosynthesis at photosystem II (PS II inhibitors)

Resistance risk: Moderate

Metsulfuron-methyl 300 g/kg + Aminopyralid 375 g/kg (Stinger™)

Rate: 20 g per 100 L of water

Comments: Spray to thoroughly wet all foliage, Uptake spray oil or Pulse penetrant should be added.

Withholding period: 3 - 56 days (see label)

Herbicide group: B, Inhibitors of acetolactate synthase (ALS inhibitors) + I, Disruptors of plant cell growth (synthetic auxins)

Resistance risk: High/Moderate

Metsulfuron-methyl 600 g/kg (Various products)

Rate: 10 g per 100 L of water

Comments: Apply when bushes are actively growing. Thoroughly wet all foliage and canes at commencement of flowering.

Withholding period: Nil (recommended not to graze for 7 days before treatment and for 7 days after treatment to allow adequate chemical uptake in target weeds).

Herbicide group: B, Inhibitors of acetolactate synthase (ALS inhibitors)

Resistance risk: High

Metsulfuron-methyl 600 g/kg (Various products)

Rate: 1 g/L + organosilicone penetrant

Comments: Gas gun / Splatter gun application. Thoroughly wet all foliage and canes. Commence application at flowering as this indicates good growing conditions.

Withholding period: Nil (recommended not to graze for 7 days before treatment and for 7 days after treatment to allow adequate chemical uptake in target weeds).

Herbicide group: B, Inhibitors of acetolactate synthase (ALS inhibitors)

Resistance risk: High

Picloram 100 g/L + Triclopyr 300 g/L + Aminopyralid 8 g/L (Grazon Extra®)

Rate: 350 or 500 mL per 100 L water

Comments: Treat in late spring to autumn. Use an adjuvant.

Withholding period: Where product is used to control woody weeds in pastures there is a restriction of 12 weeks for use of treated pastures for making hay and silage; using hay or other plant material for compost, mulch or mushroom substrate; or using animal waste from animals grazing on treated pastures for compost, mulching, or spreading on pasture/crops.

Herbicide group: I, Disruptors of plant cell growth (synthetic auxins)

Resistance risk: Moderate

Picloram 20 g/kg (Tordon® Granules)

Rate: 35–45 g /m²

Comments: Apply granules over an area extending from main stem to 30 cm outside the drip line.

Withholding period: Nil.

Herbicide group: I, Disruptors of plant cell growth (synthetic auxins)

Resistance risk: Moderate

Picloram 44.7 g/L + Aminopyralid 4.47 g/L (Vigilant II ®)

Rate: Undiluted

Comments: Cut stump/stem injection application. Apply a 3–5 mm layer of gel for stems less than 20 mm. Apply 5 mm layer on stems above 20 mm .

Withholding period: Nil.
Herbicide group: I, Disruptors of plant cell growth (synthetic auxins)
Resistance risk: Moderate

Triclopyr 200 g/L + Picloram 100 g/L (Tordon® DSH)

Rate: 500 mL per 100 L of water
Comments: Late spring to autumn treatment. Use an adjuvant.
Withholding period: Nil.
Herbicide group: I, Disruptors of plant cell growth (synthetic auxins)
Resistance risk: Moderate

Triclopyr 300 g/L + Picloram 100 g/L (Various products)

Rate: 350 or 500 mL per 100 L of water
Comments: Late spring to early autumn when bushes are actively growing. Use the higher rate on plants which have been damaged by grazing stock or insects.
Withholding period: Nil.
Herbicide group: I, Disruptors of plant cell growth (synthetic auxins)
Resistance risk: Moderate

Triclopyr 300 g/L + Picloram 100 g/L (Various products)

Rate: 335 mL per 10 L of water
Comments: Gas gun / Splatter gun application. Apply to actively growing bushes.
Withholding period: Nil.
Herbicide group: I, Disruptors of plant cell growth (synthetic auxins)
Resistance risk: Moderate

Triclopyr 600 g/L (Garlon® 600)

Rate: 170 mL per 100 L of water
Comments: Late spring to early autumn. Actively growing bushes. Do not use under dry conditions.
Withholding period: Nil.
Herbicide group: I, Disruptors of plant cell growth (synthetic auxins)
Resistance risk: Moderate

Triclopyr 600 g/L (Garlon® 600)

Rate: 280 mL per 10 L of water
Comments: Gas gun / Splatter gun application. Good control will be achieved, similar to high volume application, where bush size enables good coverage of entire bush. The use of marking agent is recommended.
Withholding period: Nil.
Herbicide group: I, Disruptors of plant cell growth (synthetic auxins)
Resistance risk: Moderate

Biosecurity duty

The content provided here is for information purposes only and is taken from the *Biosecurity Act 2015* and its subordinate legislation, and the Regional Strategic Weed Management Plans (published by each Local Land Services region in NSW). It describes the state and regional priorities for weeds in New South Wales, Australia.

Area

All of NSW

Duty

General Biosecurity Duty

*All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.*

Area	Duty
All of NSW	<p>Prohibition on certain dealings <i>Must not be imported into the state, sold, bartered, exchanged or offered for sale.</i></p> <p>All species in the Rubus fruticosus species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree</p>
Central Tablelands	<p>Regional Recommended Measure <i>Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.</i></p> <p>Protect conservation areas, natural environments and primary production lands that are free of blackberry</p>
Hunter	<p>Regional Recommended Measure <i>The plant should not be bought, sold, grown, carried or released into the environment. Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread from their land. Land managers to reduce impacts from the plant on priority assets.</i></p>
<p>North West An exclusion zone is established for all lands in the region, except the core infestation area comprising the Gwydir Shire council, Liverpool Plains Shire council and Tamworth Regional council</p>	<p>Regional Recommended Measure <i>Whole of region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: Land managers should mitigate the risk of new weeds being introduced to their land; land managers should mitigate spread from their land. Core infestation: Land managers reduce impacts from the plant on priority assets</i></p>
Northern Tablelands	<p>Regional Recommended Measure <i>Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.</i></p>



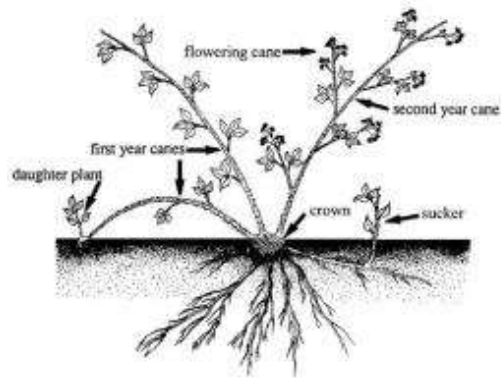
Blackberry flower (*Rubus anglocandicans*) with 5 white petals (Photo: Auld and Medd)



Blackberry leaves covered in black and yellow spots, damage from leaf rust fungus (*Phragmidium violaceum*) (Photo: J J Dellow)



Blackberry forms tall, tangled thickets (Photo: Auld & Medd)



Labelled diagram of the *Rubus fruticosus* aggregate plant parts (Photo: Birgitte Verbeek)



Rubus anglocandicans flower with five white petals, and serrated green leaves (Photo: B. Verbeek)



Light green fruit starting to form on *R. anglocandicans* (Photo: B Verbeek)



A valley infested with blackberry. The shorter light green clumps are *Rubus leucostachys* (Photo: John Hosking)



Red and blue-black blackberry fruit, and serrated green leaves (Photo: John Hosking)



Blackberry infestation blocking access into bushland (Photo: John Hosking)



Close up of blackberry flower with five pink petals (Photo: John Hosking)



Blackberry has thorny stems (Photo: John Hosking)



Thorny blackberry stem and pink flowers (Photo: John Hosking)



Serrated tussock

Nassella trichotoma



Clumpy serrated tussock plants grow about 45 cm high (Photo: Auld and Medd)

- This plant is a Weed of National Significance
- This plant must not be sold anywhere in NSW

Profile

How does this weed affect you?

Serrated tussock is not palatable to livestock and has little feed value. Animals forced to graze serrated tussock can become malnourished and may die with a stomach full of partly digested serrated tussock. Serrated tussock can:

- take over pastures and native vegetation
- reduce pasture quality
- contaminate hay and grain.

The native vegetation communities at risk include:

- native grasslands
- grassy woodlands dry forests
- some coastal vegetation.

Serrated tussock can completely take over new areas within 4 years. It is similar in appearance to many native species making it difficult to identify when not in flower. Subsequently, it can go unnoticed for many years. A single plant can produce up to 140,000 seeds each season. Serrated tussock is hard to get rid of, control is costly and herbicides used to control serrated tussock impact other grasses, especially natives.

What does it look like?

Serrated tussock grows in upright tussocks up to 45 cm tall and 25 cm wide.

The colour of the plant changes over seasons. In:

- spring, the clumps are light green with brown tips on the leaves
- late spring and early summer, the clumps have a purple tinge when the seed heads are fully emerged
- summer, plants are green when other grasses turn brown.
- winter when frosted, the plants turn a golden yellow.

Leaves are:

- very narrow and tightly rolled
- upright and stiff
- whitish at the base, looking like shallots
- serrated, felt when drawing the leaf between your fingers.

Ligule:

The ligule is one of the key identification features for serrated tussock. The ligule can be found at the junction of the leaf sheath and the leaf. Slowly separate and bend the leaf back to see if there is a small, milky coloured, hairless flap 1mm long protruding vertically

Seedheads:

Multiple seedheads are produced and can be present from September to March . Each seedhead:

- has multiple branches with a single seed at the end of each branch
- is up to 35 cm long and they tend to “weep” over the plant
- can break off when mature and be easily blow away by the wind
- has a purple tinge when mature due to the reddish brown or purple bracts wrapping around each seed.

Seeds:

- are golden brown and hard
- are small, 1.5 mm long
- have a ring of white hairs where they connect to the plant
- have an awn 25 mm long, offset from the centre at the other end of the seed.

Roots are:

- deep
- fibrous
- difficult to pull out of the ground, even when plants are small.

Similar looking plants

Serrated tussock looks like some native Australian grasses including:

- corkscrew grass (*Austrostipa setacea*)
- poa tussock (*Poa labillardierei*)
- snowgrass (*Poa sieberiana*)
- wallaby grass (*Rytidosperma pallidum*).

Key features of serrated tussock are:

- leaves are rolled rather than folded

- leaf base is white
- ligule is 1 mm long white and hairless.

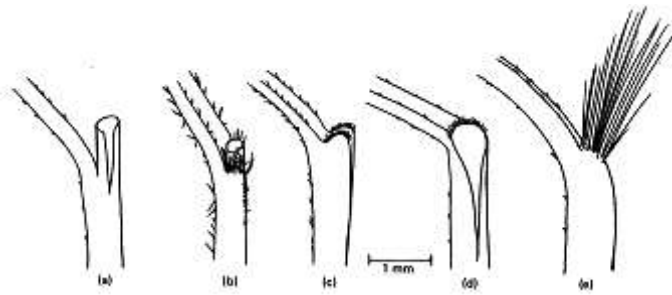


Figure A. Ligules of (a) serrated tussock; (b) corkscrew grass; (c) snowgrass; (d) poa tussock; (e) red-anthered wallaby grass.

Where is it found?

The main infestations are in the Central and Southern Tablelands of NSW. There is some serrated tussock on the Northern Tablelands.

It was first introduced to Australia in the early 1900s and first identified in 1935. In 1976, 680 000 ha of NSW had serrated tussock. By 2003 this area had increased to 820 000 ha. The area with serrated tussock within NSW continues to increase.

Serrated tussock is native to South America. It is a weed in New Zealand, South Africa, Europe and North America.

What type of environment does it grow in?

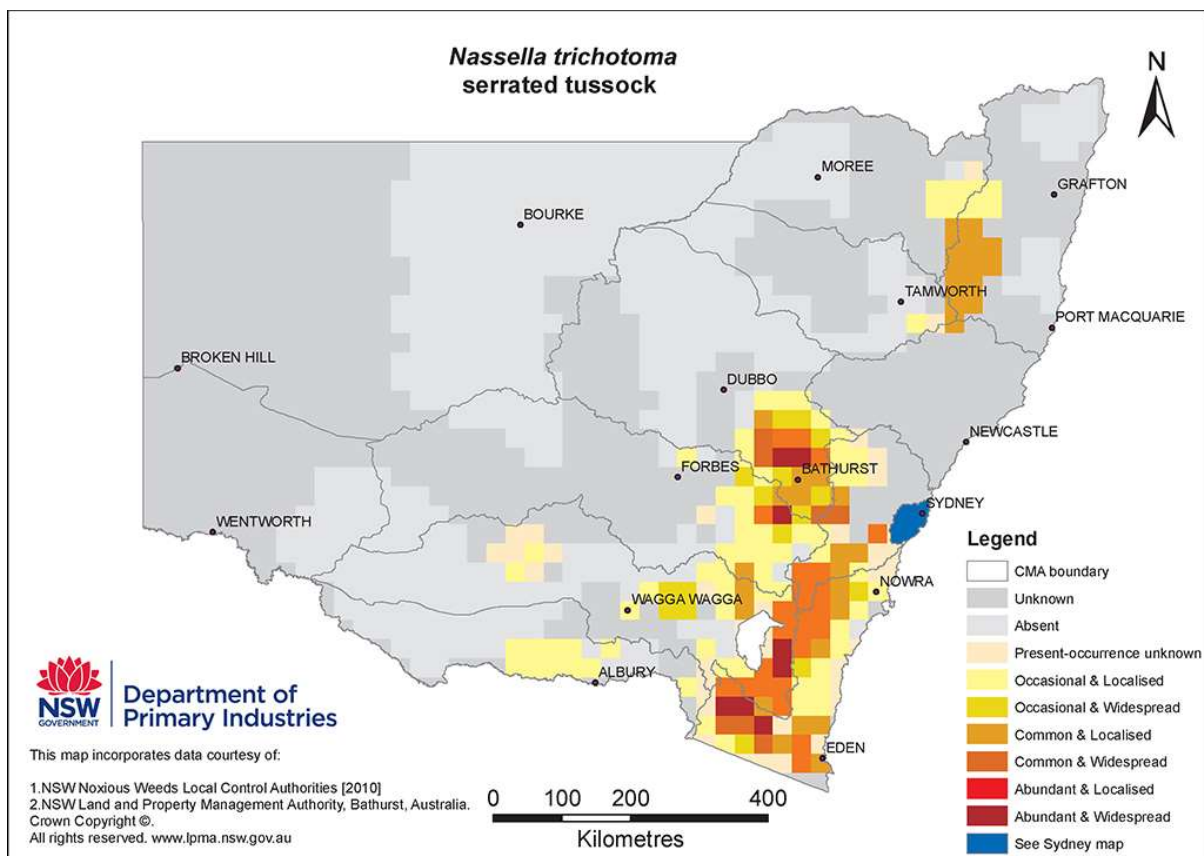
Serrated tussock prefers to grow on the tablelands of NSW, although it can be found on the coast and slopes. The optimum temperature range is 10 - 15 °C. It tolerates:

- acid and alkaline soil
- dry conditions
- rocky areas
- shallow soil if it is not in competition with other plants
- soils derived from basalt, granite, shale, slate and sandstone.

It does not grow well in:

- hot weather
- wet areas
- heavy shade e.g. under a thick tree canopy
- saline soils or salty areas
- competition from other plants.

Distribution map



How does it spread?

Serrated tussock seeds can spread long distances by wind and water. Wind is the main way it is spread. The mature seed heads break off at the base and are carried long distances by wind - 10 km or more if conditions are favourable. Seeds have been known to move 60 km downstream from the nearest infestation on the banks of the Macquarie River.

Seeds also spread with feed, animals and machinery. Animals can pick up seeds in hooves, fleeces or coats. Serrated tussock seeds remain viable passing through an animal's gut.

Serrated tussock colonises bare areas. Drought causing bare ground favours serrated tussock. Sandy, nutrient poor soils are at most risk.

More information

- Recognising, managing and preventing herbicide resistance in serrated tussock (<https://www.dpi.nsw.gov.au/biosecurity/weeds/weed-control/herbicides/recognising-managing>)
- NSW Weed Risk Assessment (<https://www.dpi.nsw.gov.au/biosecurity/weeds/strategy/nsw-weed-risk-management-system/wrm-system/serrated-tussock>)
- Serrated Tussock National Best Practice Management Manual (<http://www.serratedtussock.com/sites/default/files/Serrated-Tussock-National-Best-Practice-Management-Manual.pdf>)
- Eight steps to successful perennial pasture establishment (<https://www.dpi.nsw.gov.au/agriculture/pastures-and-rangelands/establishment-mgmt/establishment/eight-steps>)
- Weed futures: Determining current and future weed threats in Australia, *Nassella trichotoma*. Macquarie University. (<http://www.weedfutures.net/species.php?id=1132>)
- PlantNET NSW FloraOnline, *Nassella trichotoma*. Royal Botanical Gardens and Domain Trust. (<https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Nassella~trichotoma>)

Control

Successful weed control relies on early action and follow up after initial efforts. Using a combination of control methods is usually more successful.

Prevention:

- Learn how to identify serrated tussock.

- Control plants quickly delaying control allows a quick transition to more and more plants. Larger infestations become costly and difficult to control.
- Limit animal movement from infested areas into clean paddocks.
- Quarantine stock from infested areas for at least 10 days to pass seed through the gut before releasing them to clean paddocks.
- Avoid bringing hay, grain, or silage from serrated tussock areas onto your property.
- Inspect hay or fodder (even from clean areas) for weed seeds.
- Plant windbreaks to reduce seeds blowing in.
- Clean vehicles and machinery before moving into clean areas.

Pasture management

Maintaining healthy pastures and 100% ground cover is the best long-term defence against serrated tussock.

Establishing and maintaining healthy pastures can require different techniques and this will be influenced by many factors such as topography, rainfall, grazing management, and soil type. Further information is available on the Pastures and Rangelands section of NSW DPI website.

Grazing

Serrated tussock is not very palatable and has little feed value. Animals can graze it for short periods, but will lose condition. Animals favour other pasture species over serrated tussock. This promotes the dominance of the weed. Pastures will deteriorate with continuous grazing.

Physical removal

Remove individual plants with a mattock in small, isolated patches. Bag and dispose of the plants. Also dispose of soil attached to roots as it may contain seeds. Tussocks with flowers should be burnt after removal.

Sow pasture seed where the ground is bare.

Forestry

Planting trees with a dense canopy like pines is an effective long-term strategy. It will take many years for trees to be large enough to suppress serrated tussock. Use other control methods in the meantime. Commercial forestry may be an option. Seek expert advice before investing in forestry projects.

Biological control

There are no effective biological control agents in Australia for serrated tussock.

Chemical control

Most herbicides used to control serrated tussock contain either glyphosate or flupropanate. Pasture species have variable tolerance to these herbicides. Check which pasture species are present prior to determining which chemical control option can be used.

Herbicides are most effective in combination with healthy, competitive pastures. Repeated use of the same herbicide can lead to herbicide resistance.

Always observe grazing withholding periods following herbicide treatments in pastures.

Flupropanate herbicides

Legumes and some native pasture species (e.g. weeping grass, wallaby grass, spear grass) can be killed by flupropanate herbicides. Kangaroo grass and redgrass are more tolerant.

Flupropanate can remain active in the soil for up to two years. Residual activity depends on the amount of rainfall. Residual activity is longer with low rainfall or drought. Flupropanate continues killing serrated tussock seedlings until 100mm of leaching rainfall has fallen.

The herbicide washes out faster from sandy soils than clay soils. Do not sow a new pasture or crop until flupropanate is likely to have washed out of the root zone.

Flupropanate takes several months to kill serrated tussock. It may not stop seed production when applied after mid-August. Apply 2 – 4 weeks before seed heads emerge (indicated by thickening of tillers). After

seeding, use a mix of glyphosate + flupropanate.

Label rates of flupropanate control serrated tussock with minimal damage to young native trees.

Glyphosate herbicides

Use glyphosate for a complete knockdown of serrated tussock and other weeds. Glyphosate has no residual effect. Carefully timed applications can allow some selectivity - killing serrated tussock whilst preserving dormant desirable pastures. It is important to get good spray coverage of all the target plant or it may recover.

Apply glyphosate:

- in spring before crop or pasture in autumn
- just before sowing in autumn
- when plants are actively growing
- to spot spray serrated tussock before it seeds.

Avoid using glyphosate when:

- soil is dry and serrated tussock plants are stressed
- there are frosts or dew on the plant
- dead plant material covers the growing parts of weeds.

Glyphosate can be unreliable when:

- tussocks are mature,
- AND growing on fertile clay soils,
- AND there is low rainfall.

Spot spraying

Spot spray individual clumps or small patches year round, before plants set seed. Calibrate spray equipment to ensure you apply the correct rate of herbicide. Only spray the tussock plants. A spray shield can minimise damage to surrounding plants. Check paddocks after spraying for any missed plants.

Broadacre spraying

Herbicide can be applied with boomsprays or aircraft for larger areas.

Weed wipers

Graze to reduce the height of desirable pasture species before using wipers. Both flupropanate and glyphosate are suitable.

Wiping is only effective on large tussocks. Repeat treatment as smaller tussocks mature. Use the wiper in two directions to improve efficacy.

Herbicide resistance

Herbicide resistant plants that spread by seed are harder to control. Serrated tussock is not reported as resistant to glyphosate. It has become resistant to flupropanate in some areas.

Herbicide resistance is more likely to develop when treating large areas with a lot of weeds. Avoid herbicide resistance developing by:

- rotating flupropanate with glyphosate herbicide
- spraying before seed set
- using other control methods with herbicide (cropping, pasture, chipping, forestry, grazing and fertiliser)
- reducing populations over time
- checking for weed survival after spraying
- treating survivors with a different herbicide.

Herbicide options

WARNING - ALWAYS READ THE LABEL

Users of agricultural or veterinary chemical products must always read the label and any permit, before using the product, and strictly comply with the directions on the label and the conditions of any permit. Users are not absolved from compliance with the directions on the label or the conditions of the permit by reason of any

statement made or not made in this information. To view permits or product labels go to the Australian Pesticides and Veterinary Medicines Authority website www.apvma.gov.au

See Using herbicides (<http://www.dpi.nsw.gov.au/biosecurity/weeds/weed-control>) for more information.

PERMIT 9792 Expires 30/11/2025

Glyphosate 360 g/L (Various products)

Rate: 1 L per 2 L of water

Comments: Wick wiping application.

Withholding period: Nil.

Herbicide group: M, Inhibitors of EPSP synthase

Resistance risk: Moderate

Flupropanate 745 g/L (Tussock®)

Rate: 1.5–2.0 L/ha

Comments: Boom and aerial application. June to August inclusive. Four-month withholding period for blanket application.

Withholding period: Spot spray: Do NOT graze or cut for stock feed for at least 14 days. Blanket spray: Do NOT graze, or cut for stock feed for at least 4 months. If stock are grazed in treated areas after required time has passed, remove stock from treated areas and do NOT slaughter or milk for human consumption until they have been on clean feed for at least 14 days.

Herbicide group: J, Inhibitors of fat synthesis (Not ACCase inhibitors)

Resistance risk: Moderate

Flupropanate 745 g/L (Tussock®)

Rate: 100–200 mL per 100 L of water

Comments: Spot spray from September to May. Four month withholding period for blanket application.

Withholding period: Spot spray: Do NOT graze or cut for stock feed for at least 14 days. Blanket spray: Do NOT graze, or cut for stock feed for at least 4 months. If stock are grazed in treated areas after required time has passed, remove stock from treated areas and do NOT slaughter or milk for human consumption until they have been on clean feed for at least 14 days.

Herbicide group: J, Inhibitors of fat synthesis (Not ACCase inhibitors)

Resistance risk: Moderate

Flupropanate 86.9 g/kg (GP Flupropanate)

Rate: 15kg per ha

Comments: Apply February to December inclusive. Four month withholding period for blanket application.

Withholding period: Do not graze or cut for stock feed areas which have received any treatment other than spot treatment for at least 4 months. Spot treatment: Do not graze or cut for stock feed for at least 14 days. If stock are grazed in treated areas after required time has passed, remove stock from treated areas and do NOT slaughter or milk for human consumption until they have been on clean feed for at least 14 days. This requirement applies permanently to treated areas.

Herbicide group: J, Inhibitors of fat synthesis (Not ACCase inhibitors)

Resistance risk: Moderate

Flupropanate 86.9 g/kg (GP Flupropanate)

Rate: 1.5g/m²

Comments: Spot application apply all year round.

Withholding period: Do not graze or cut for stock feed areas which have received any treatment other than spot treatment for at least 4 months. Spot treatment: Do not graze or cut for stock feed for at least 14 days. If stock are grazed in treated areas after required time has passed, remove stock from treated areas and do NOT slaughter or milk for human consumption until they have been on clean feed for at least 14 days. This requirement applies permanently to treated areas.

Herbicide group: J, Inhibitors of fat synthesis (Not ACCase inhibitors)

Resistance risk: Moderate

Glyphosate 360 g/L (Various products)

Rate: 0.7–1.3 L to 100 L of water

Comments: Spot spray application.

Withholding period: Nil.

Herbicide group: M, Inhibitors of EPSP synthase

Resistance risk: Moderate

Glyphosate 360 g/L (Various products)

Rate: 4.0–6.0 L/ha

Comments: Boom spray. Apply to actively growing, stress-free plants.

Withholding period: Nil.

Herbicide group: M, Inhibitors of EPSP synthase

Resistance risk: Moderate

Glyphosate 360 g/L (Various products)

Rate: 0.75–1.25 L/ha

Comments: Spray topping application. Apply to actively growing, stress-free plants.

Withholding period: Nil.

Herbicide group: M, Inhibitors of EPSP synthase

Resistance risk: Moderate

Biosecurity duty

The content provided here is for information purposes only and is taken from the *Biosecurity Act 2015* and its subordinate legislation, and the Regional Strategic Weed Management Plans (published by each Local Land Services region in NSW). It describes the state and regional priorities for weeds in New South Wales, Australia.

Area**Duty****All of NSW****General Biosecurity Duty**

*All plants are regulated with a **general biosecurity duty** to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.*

All of NSW**Prohibition on certain dealings**

Must not be imported into the state, sold, bartered, exchanged or offered for sale.

Central Tablelands**Regional Recommended Measure**

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.

Protect conservation areas, natural environments and primary production lands that are free of serrated tussock

Central West

Exclusion zone: whole region except for the core infestation area that is bounded by the Central West Local Land Services boundary north along Burrendong Way to Stuart Town, east along Mookerawa Road to Burrendong Dam, and east along Oak Creek, bounded by the Central West Local Land Services boundary

Regional Recommended Measure

Whole region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation area: Land managers should reduce impacts from the plant on priority assets. Land managers should mitigate the risk of the plant being introduced to their land.

Greater Sydney

Exclusion zone: whole region excluding the core infestation area of Wollondilly and Camden local government areas.

Regional Recommended Measure

Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. The plant or parts of the plant should not be traded, carried, grown or released into the environment. Notify the Local Control Authority if found. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core infestation: Land managers prevent spread from their land where feasible.

Area	Duty
Hunter	<p>Regional Recommended Measure <i>Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.</i></p>
Murray	<p>Regional Recommended Measure <i>Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.</i></p>
<p>North West An exclusion zone is established for all lands in the region, except the core infestation area comprising all Local Government Areas east of the Newell Highway</p>	<p>Regional Recommended Measure <i>Whole of region: The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: Land managers should mitigate the risk of new weeds being introduced to their land; land managers should mitigate spread from their land; the plant should be eradicated from the land and the land kept free of the plant. Core infestation: Land managers reduce impacts from the plant on priority assets</i></p>
Northern Tablelands	<p>Regional Recommended Measure <i>Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.</i></p>
Riverina	<p>Regional Recommended Measure <i>Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.</i></p>
<p>South East Core infestation: whole region except the exclusion zone of Shoalhaven, Eurobodalla, Kiama, Wollongong, Bega Valley and Shellharbour councils</p>	<p>Regional Recommended Measure <i>Whole region: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: Land managers should mitigate spread from their land. Core area: Land managers reduce impacts from the plant on priority assets.</i></p>



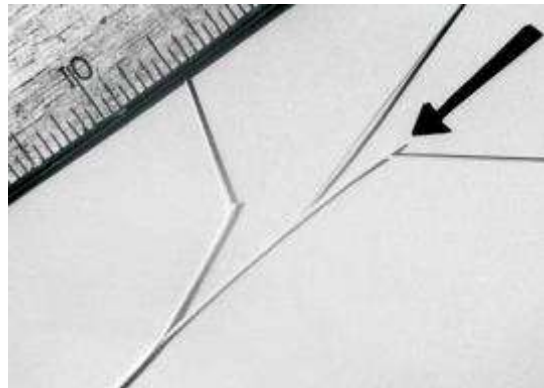
A paddock taken over by serrated tussock (Photo: Warwick Badgery)



A newly established pasture on the right of the fence, clumps of serrated tussock on the left (Photo: Malcolm Campbell)



Serrated tussock with purple tinged flower head (Photo: Birgitte Verbeek.)



A ligule at the junction of the leaf blade and leaf sheath (Photo: Malcolm Campbell)



A green serrated tussock plant in early January after flowering (Photo: Linda Ayres.)



Serrated tussock has a fibrous root system (Photo: Linda Ayres.)



Serrated tussock seeds are small and hard with rough seed coats and a ring of white hairs where they connect to the plant (Photo: Julia Scher, Bugwood.org)

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