



BUFFEL GRASS

Best practice management
guide for the resource industries



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Images courtesy of Troy Bowman, PIRSA and M Heinson

Date	Comment
March 2026	First circulated for stakeholder feedback.
August 2026	First Published.





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Acronyms

APVMA	Australian Pesticides and Veterinary Medicines Authority
APY	Anangu Pitjantjatjara Yankunytjatjara
BDBSA	Biological Database of South Australia
DEM	Department of Energy and Mining
DIT	Department for Infrastructure and Transport
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
ER Act	Energy Resources Act 2000
HRE Act	Hydrogen and Renewable Energy Act 2023
PEPR	Program for Environment Protection and Rehabilitation
PIRSA	Department of Primary Industries and Regions
SEO	Statement of Environmental Objectives

Landscape Board Regions in South Australia

AW	Alinytjara Wilurara
EP	Eyre Peninsula
GA	Green Adelaide
HF	Hills and Fleurieu
KI	Kangaroo Island
LC	Limestone Coast
MR	Murraylands and Riverland
NY	Northern and Yorke
SAAL	South Australian Arid Lands



Buffel grass is a declared weed under the Landscape South Australia Act because it poses significant threats to biodiversity, infrastructure, worker safety and cultural values.



Introduction

This best practice guide has been developed to support South Australian industries – particularly mining and energy exploration, production and generation – to understand and manage the risks associated with buffel grass (*Cenchrus ciliaris* and *Cenchrus pennisetiformis*). Buffel grass is a declared weed under the *Landscape South Australia Act 2019* because it poses significant threats to biodiversity, infrastructure, worker safety and cultural values.

This guide provides clear, concise and practical advice to help land managers and operators:

- identify buffel grass
- comply with regulatory obligations
- prevent further spread
- implement effective control strategies.

This guide synthesises existing best practice knowledge and regulatory requirements by summarising key information from strategic plans, policies and relevant legislation. This guide also links to more detailed resources, so users can access comprehensive information where needed. Its aim is to support consistent, informed action across the mining and energy sectors and contribute to the coordinated management of buffel grass across South Australia.

FURTHER INFORMATION

This guide provides a summary of buffel grass identification, its impacts and best practice management. The content is based on the following key sources.

- [South Australian buffel grass strategic plan 2019–2024](#)
- [Buffel grass best practice management guide: Alinytjara Wilurara NRM Region](#)
- [Declared plant policy for buffel grass.](#)

Additional information sources are listed in the Further information section of this guide. Visit these sources for detailed information on buffel grass and its management.





What is buffel grass?

Buffel grass is a deep-rooted, summer-growing, long-lived tussock grass native to Africa, Asia and the Middle East. In Australia, 'buffel grass' refers collectively to two closely related species – *Cenchrus ciliaris* and *Cenchrus pennisetiformis*. Although both species are often grouped under the same common name, they can differ in appearance, characteristics and distribution.

Buffel grass is believed to have been accidentally introduced to the north-west coast of Western Australia in the 1870s via Afghan camel harnesses.

After World War I, the WA Department of Agriculture distributed *Cenchrus* varieties from Afghanistan, leading to the first planting in Queensland at Cloncurry in 1926 (Humphreys, 1967). In northern South Australia, buffel grass was introduced both accidentally and intentionally, with small-

scale trials on pastoral properties beginning in the 1950s (Greenfield, 2007). Its spread has been facilitated by wind, water, animals, and machinery.

South Australia took the lead in 2015 as the first jurisdiction in Australia to declare buffel grass under its weed management legislation (Biosecurity SA, 2019), and it is currently listed as a declared weed under the Landscape South Australia Act 2019. The Northern Territory became the second jurisdiction to declare buffel grass a declared weed in 2024. However, in some other parts of Australia - particularly Queensland and areas of New South Wales - it is still widely used as a pasture species to support grazing and is not classified as a declared weed. These differences lead to contrasting perspectives about its value and impact across the country, creating challenges for achieving consistent national management.



Buffel grass clump (Troy Bowman, PIRSA)



Why it's a problem

Buffel grass is one of the most invasive and damaging weeds in arid and semi-arid parts of Australia. It spreads rapidly, outcompetes native plants, and can drastically change natural ecosystems.

INVASIVENESS

Buffel grass can thrive in harsh conditions, produce abundant seed, and spread in many ways. This gives it a major advantage over native species. The following features help explain why it's such a successful invader.

Rapid response to rainfall

Buffel grass can germinate, grow, flower and set seed quickly after as little as 20 mm of rain.

Prolific seed production

Buffel grass produces many seeds contained in burrs that easily detach and spread.

Multiple dispersal pathways

Seeds can spread by wind, water, animals, vehicles, machinery and human activity, including accidental transport along roads and tracks. Contaminated soil, fodder and equipment can also carry seeds long distances.

Tolerance to harsh conditions

Buffel grass has deep, fibrous roots that help it reach moisture and nutrients in the soil. This helps it survive drought, fire, grazing and poor soils.

Persistence

Individual tussocks can live for many years, and seeds can remain viable in the soil for extended periods – enabling new plants to establish over time.

Fire adaptation

Buffel grass recovers quickly after fire and produces dense, flammable growth that builds up over time. This fuels more frequent and intense fires, which suppress fire-sensitive native species and further promote the spread and dominance of buffel grass.

Competitive growth

Buffel grass outcompetes native plants for light, water and nutrients. It forms dense stands that reduce biodiversity and change ecosystem structure.





IMPACTS

Buffel grass causes widespread and long-lasting damage to environmental and cultural values. It takes over native vegetation and turns diverse, healthy landscapes into monocultures. This can displace native plants and animals, disrupt natural ecological processes, and degrade habitat quality – affecting both the environment and people. It also poses a growing risk to public safety, particularly where dense infestations increase fire danger near communities and infrastructure. Key impacts are outlined below.

Soil impacts

Even at low densities, buffel grass can deplete soil nutrients, making it harder for native plants to grow back. It may also release chemicals into the soil that stop the germination and growth of other plants.

Suppression of native plants

By out-competing native plants for light, space, water and nutrients, buffel grass can prevent native seedlings from establishing – limiting the future recovery of ecosystems.

Habitat loss

Dense, uniform stands of buffel grass replace diverse native vegetation, reducing food and shelter for native birds, reptiles and small mammals.

Impacts to threatened species

In arid South Australia, buffel grass puts many already rare and endangered animals at risk, including the black-footed rock wallaby, great desert skink, malleefowl, and several ground-foraging birds such as the chestnut quail-thrush, dusky grasswren and striated grasswren.

Fire and ecosystem impacts

High fuel loads result in hotter, larger and more frequent fires. These fires kill mature trees and shrubs, stop native plants regenerating, and favour buffel grass. Species like river red gums (*Eucalyptus camaldulensis*) and corkwoods (*Hakea* species) are particularly sensitive to these changes.

Public safety impacts

The spread of buffel grass near towns, outstations and community centres increases the risk of destructive fires. Heavy fuel loads can lead to fast-

moving, intense fires that endanger lives, damage buildings, infrastructure and other assets, and threaten community safety.

Cultural impacts

Buffel grass threatens Aboriginal people's culture by affecting traditional food plants, bush medicines and hunting practices. It can also damage or restrict access to culturally significant sites, such as soakages, rockholes and sacred places.

Dense growth can block access to hunting areas, make animal tracking more difficult, and reduce safety by concealing snakes. It also increases fire risk around communities and undermines the use of traditional patch-burning practices, which depend on cooler, more controlled fires.

Mining and Energy industry activities can facilitate the spread of buffel grass by disturbing land and creating favourable conditions for its establishment. The clearing of native vegetation and disturbance of soil during these activities expose bare ground, allowing buffel grass to establish quickly and out compete native species. The development of roads, access tracks, and other infrastructure further increases the amount of disturbed habitat, while altered drainage patterns and water runoff can transport seeds into surrounding areas where they can germinate and spread.

Mining and Energy industry activities can also introduce and disperse buffel grass through the movement of machinery, vehicles, soil, and construction materials. Seeds can be carried on equipment, tyres, and tracks or be present in contaminated soil, gravel, and fill used on site. If rehabilitation is not carefully managed, buffel grass may establish in restored areas through contaminated materials or inadequate weed control, allowing it to dominate recovering vegetation and spread into adjacent natural ecosystems.

IMPACTS TO MINING AND ENERGY INDUSTRIES

Beyond ecological and cultural consequences, buffel grass also poses direct operational, financial and legal risks for the mining and energy exploration, production and generation industries operating in South Australia. Buffel grass:

- spreads readily along access tracks, transport corridors and other disturbed areas, such as drill pads and seismic lines created during exploration and development activities
- increases fuel loads, elevating fire risk to personnel, operations, equipment and infrastructure, such as camps and processing facilities
- increases operational and maintenance costs for licensees and tenement holders, who must implement weed management programs to control its spread – in particular around linear infrastructure, such as roads and pipelines
- increases the likelihood of regulatory scrutiny related to environmental approvals, rehabilitation outcomes and compliance obligations
- reduces the success of site rehabilitation by dominating revegetation areas, increasing fire risk, and preventing the return of native species
- creates reputational risks and social-licence challenges where strong biosecurity and land-stewardship practices are expected or where culturally significant sites may be impacted.



Buffel grass fuels hot and more frequent fires (Teresa Gurney)





IDENTIFICATION

Buffel grass is usually easy to recognise when it's flowering but it can be more difficult to identify when it's not in flower. Key features include its tussock-forming growth habit, the structure and colour of its seed heads, leaf characteristics, and seasonal changes in appearance.

The two species of buffel grass can usually be distinguished by differences in how they grow and the characteristics of their seed heads:



Cenchrus ciliaris typically has coarser, denser tussocks with seed heads that vary from white to purple.



Cenchrus ciliaris



Cenchrus pennisetiformis has finer, sparser tussocks and darker seed heads that are often deep purple to black.



Cenchrus pennisetiformis



The following features will assist with identification of both species at all growth stages.

KEY FEATURES

Growth form

- grows in clumps (tussocks)
- can grow from 20 cm up to 1 metre tall
- dense root system mostly in the top 20 cm of soil.





Leaves

- are narrow, up to 30 cm long and 1-1.3 cm wide
- change colour with seasons – bright green after rain, pale straw-coloured when dry or dormant
- may be flat or folded lengthwise, with a pointed tip
- have fine hairs where the leaf blade joins the stem.



Flower heads

- present from November to May. Can be earlier depending on seasonal conditions and location
- cylindrical, fluffy-looking spikes
- up to 15 cm long and about 2 cm wide
- colour varies from purple (when young) to white or straw-coloured as it ages
- bristly burrs give it a 'fluffy' appearance; burrs contain 1-3 seeds.



Stems

- erect, tough and often branched
- grow from a swollen, bulb-like base at the centre of the tussock
- central stalk inside the seed head often has a slight zig-zag shape, which becomes visible when the seeds drop off.





Seasonal appearance

Summer (after rain) – green, actively growing



Autumn – flowering and seeding



Winter – dormant, leaves turn straw-coloured



Spring – may respond to spring rain



Lookalikes

Buffel grass can be confused with a range of native and introduced (weedy) grasses, particularly when it's not flowering. Some species may look similar in how they grow or the structure of their seed heads.

[Mallee Conservation](#) provides an [interactive 3D model](#) representation of a buffel grass plant both when actively growing and when dormant.

Where does buffel grass grow?

PREFERRED HABITATS

Buffel grass is highly adaptable and can establish across a wide range of habitats. It prefers semi-arid to arid regions where the average annual rainfall is above 200 mm (or 170 mm during summer) but can live in areas with rainfall up to 1,000 mm. In areas with higher rainfall, in tropical climates, or where winter rainfall exceeds 400 mm, buffel grass tends to be less dominant and competes less with other plant species, including perennial grasses.

Buffel grass commonly establishes along drainage lines, ephemeral watercourses, alluvial plains, roadsides and disturbed sites where moisture and nutrients are higher. Buffel grass thrives in sandy loam soils but can also establish on calcareous rises, rocky slopes and even heavy clays under certain conditions.



Buffel grass commonly grows along rail corridors





CURRENT DISTRIBUTION (South Australia)

Buffel grass is widely distributed across northern South Australia (Figure 1). The biggest infestations occur in the far north-west (Alinytjara Wilurara Landscape Board), particularly across the APY Lands and the Marla-Oodnadatta district (SA Arid Lands Landscape Board). It is also very prevalent in parts of the Marree-Innamincka district, particularly around Innamincka Regional Reserve and is a priority for the South Australian Arid Lands Landscape board given the implications for biodiversity. Scattered populations also occur along major transport corridors and infrastructure routes extending into the northern and mid-north regions.

Infestations in southern parts of the state remain limited and are often isolated, typically occurring as small, scattered populations along road reserves, transport corridors or disturbed sites, such as construction areas, mining sites and rail corridors. These outlier populations are generally the result of long-distance seed dispersal by vehicle movements and machinery. Without active intervention, these populations continue to threaten nearby buffel-free areas with local establishment and further spread.

Note that current distribution maps probably under-represent the true extent of where buffel grass occurs in South Australia. Available data draws heavily on roadside surveys and in other accessible areas. Less information is available from areas that are remote and less frequently visited.

NATIONAL DISTRIBUTION

Nationally, buffel grass is widespread across arid and semi-arid regions of Queensland, the Northern Territory and Western Australia. Occurrences extend into drier regions of New South Wales and Western Australia's southern rangelands. National distribution maps are available from the Atlas of Living Australia for [Cenchrus ciliaris](#) and [Cenchrus pennisetiformis](#).

POTENTIAL DISTRIBUTION

Climate modelling indicates that approximately 70% of South Australia is highly, very highly or extremely suitable for buffel grass establishment, and that buffel grass could grow in all parts of the state.

This modelling typically incorporates climate change projections, suggesting that increasing temperatures and other climate-driven changes may create suitable climatic conditions in additional areas of the state, potentially facilitating further expansion of buffel grass.



Buffel grass dominating a road corridor

Current distribution of buffel grass in South Australia

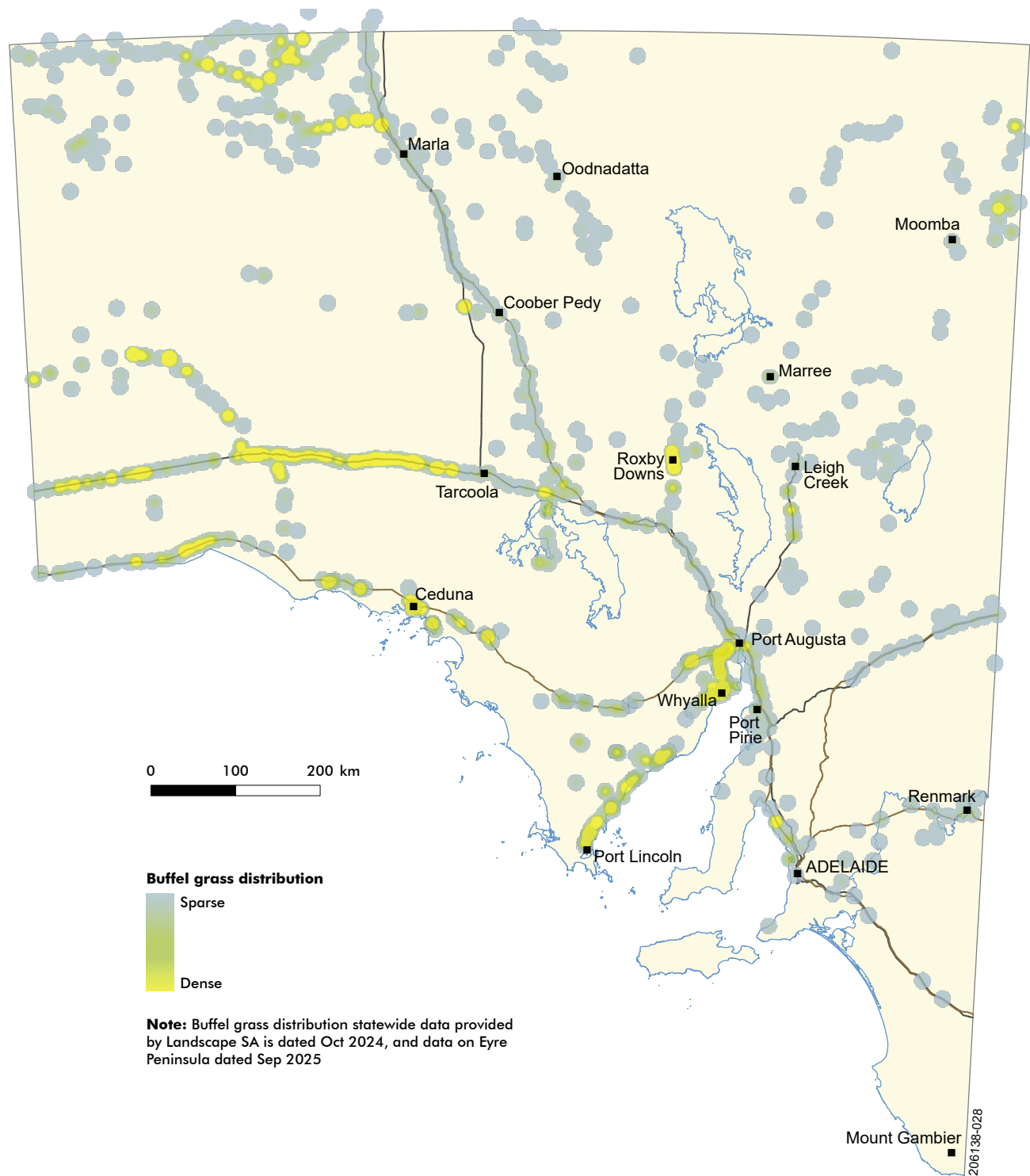


Figure 1 Source: DEM 2026

Growth and lifecycle

Buffel grass grows fastest in the summer and thrives in arid and semi-arid environments. Its lifecycle and reproductive strategy mean it can respond rapidly to rainfall and disturbance. With as little as 20 mm of rain, buffel grass seeds can germinate and grow rapidly. Plants can flower within three weeks. In better conditions, plants can flower within 10 days of germination. The general growth pattern of buffel grass is summarised in Table 1.

Buffel grass produces large numbers of seeds. One to three seeds are encased in a cluster of bristles known as a burr. Most seeds are viable for up to 12 months.

However, some can survive in the soil for up to four years, and some may still be viable for five to seven years under certain conditions. This seed bank means that buffel grass can rapidly come back after fire or other disturbance. Individual buffel grass tussocks can live for up to 20 years.

Buffel grass uses a type of photosynthesis that works more efficiently than many native plants under hot, dry and sunny conditions. This helps it survive drought, grow quickly, and outcompete native grasses and wildflowers – especially during the warmer months when many native species are dormant or slow-growing.

General growth pattern of buffel grass
(based on Northern and Yorke Landscape Board n.d.)

	SUMMER			AUTUMN			WINTER			SPRING		
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Germination												
Active growth												
Flowering												
Seeding												

General growth pattern Possible growth pattern under favourable conditions*

* Favourable conditions generally refer to rainfall events and soil disturbance

Table 1

Spread

Buffel grass reproduces mostly by seed but it also spreads vegetatively. This means it can grow new plants from parts of the existing plant, through underground stems and above-ground runners. Vegetative reproduction allows buffel grass to spread in all directions and to grow back quickly after disturbances like fire or grazing.

Buffel grass spreads easily in many ways (Table 2). These traits make it highly persistent and difficult to control once established.

How buffel grass spreads in the landscape

	Wind – disperses fluffy burrs over short distances.
	Water – floods and runoff transport seeds along creeks and drainage lines.
	Animals – burrs attach to the fur of livestock and wildlife.
	Vehicles and machinery – seeds cling to tyres, undercarriages and equipment. Grading and earthworks move soil that can contain seeds.
	Contaminated materials – such as hay, gravel, soil and clothing. <i>Note: Under the Landscape South Australia Act 2019, a permit from PIRSA or the relevant Landscape Board is required to move declared pest plants (or animals), which also includes the movement of soil, machinery and material contaminated by pest plants</i>

Table 2



Buffel grass seeds can spread by clothing, boots and other equipment



Legal obligations

WEED MANAGEMENT

Buffel grass is a declared plant under the Landscape South Australia Act 2019. In South Australia, you can't:

- **import buffel grass**
- **sell buffel grass**
- **move buffel grass on public roads**
- **sell good contaminated with buffel grass.**

Exemptions may be granted for some activities. [South Australia's buffel grass policy has more information.](#)

These obligations relate to the three management zones that guide strategic, state-wide control of buffel grass (Figure 2). The zones are:

- Zone 1 – Manage buffel grass in the far north-west (AW, SAAL)
- Zone 2 – Protect sites across much of the northern and upper mid-north areas (SAAL)
- Zone 3 – Destroy infestations across southern and coastal regions (AW, EP, GA, HF, KI, LC, MR, NY).

These zones aim to prevent further spread into uninfested areas, protect high-value assets, and reduce impacts on biodiversity, cultural sites, infrastructure and communities. Regional landscape boards coordinate local responses for priority weeds such as buffel grass. Responsibility for managing roadsides is typically shared between local councils and the South Australian Department for Infrastructure and Transport.

The Further information section has more details, including any regional variations required to support this strategic management approach and a full description of region names, Management of energy and mining licenses and tenements.



Current zones of buffel grass in South Australia



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Data Source: AW Landscape Board, Topographic and Administrative Data – From various State government departments
Map Datum: GDA 94
Date: 28/10/2024



AW Landscape Board: 2024917_001

Figure 2





MANAGEMENT OF ENERGY AND MINING LICENSES AND TENEMENTS

The South Australian Department for Energy and Mining (DEM) oversees the responsible development of South Australia's minerals, metals and fuels. It achieves this through consistent, risk-based regulation that ensures licensees and tenement holders meet their regulatory obligations, including the expectations of the people of South Australia. This includes the requirement to explore for, produce and transmit the state's mineral and energy resources in an ecologically sustainable manner – including responsible land management and the control of invasive species such as buffel grass. The DEM regulates these resource industries under three primary pieces of legislation:

- mining under the *Mining Act 1971*
- energy resources (petroleum, geothermal, transmission pipelines and underground gas storage) under the *Energy Resources Act 2000*
- hydrogen and renewable energy under the *Hydrogen and Renewable Energy Act 2023*.

The approval pathways are summarised below and in Figure 3.

Mining approvals

Under the Mining Act, mining projects follow a two-stage process:

1. Mining tenement – applicants must obtain mining tenure before mineral exploration, mineral extraction or sale can commence.
2. Environmental approval via a program for Environment Protection and Rehabilitation (PEPR) – after lease grant, operators must submit a program, and mining cannot begin until that program is approved.

This ensures environmental and rehabilitation controls are in place before operations start.

Energy resource approvals

For energy activities (like petroleum, geothermal, pipeline transmission and underground storage of gas) regulated under the Energy Resources Act, the DEM follows a three-stage process:

1. Licence is granted.
2. Environmental assessment is undertaken – proponents prepare an environmental impact report (EIR) and a statement of environmental objectives (SEO) for approval, with mandatory public and co-regulator consultation.
3. Operational approval is gained via activity notification.

The [Approvals process](#) webpage of the DEM website has more information on the Energy Resources Act.

Hydrogen and renewable energy approvals

For large-scale hydrogen and renewable projects regulated under the Hydrogen and Renewable Energy Act (HRE), the DEM follows a three-stage process like that of the Energy Resources Act:

1. Environmental assessment is undertaken – proponents prepare an environmental impact report (EIR) and a statement of environmental objectives (SEO) for approval, with mandatory public and stakeholder consultation.
2. Licence is granted.
3. Operational approval is gained via an approved operational management plan.

The [Licensing and approvals](#) webpage of the DEM website has more information on the HRE Act approvals process.

Summary of the approval processes for mining and energy projects in South Australia.

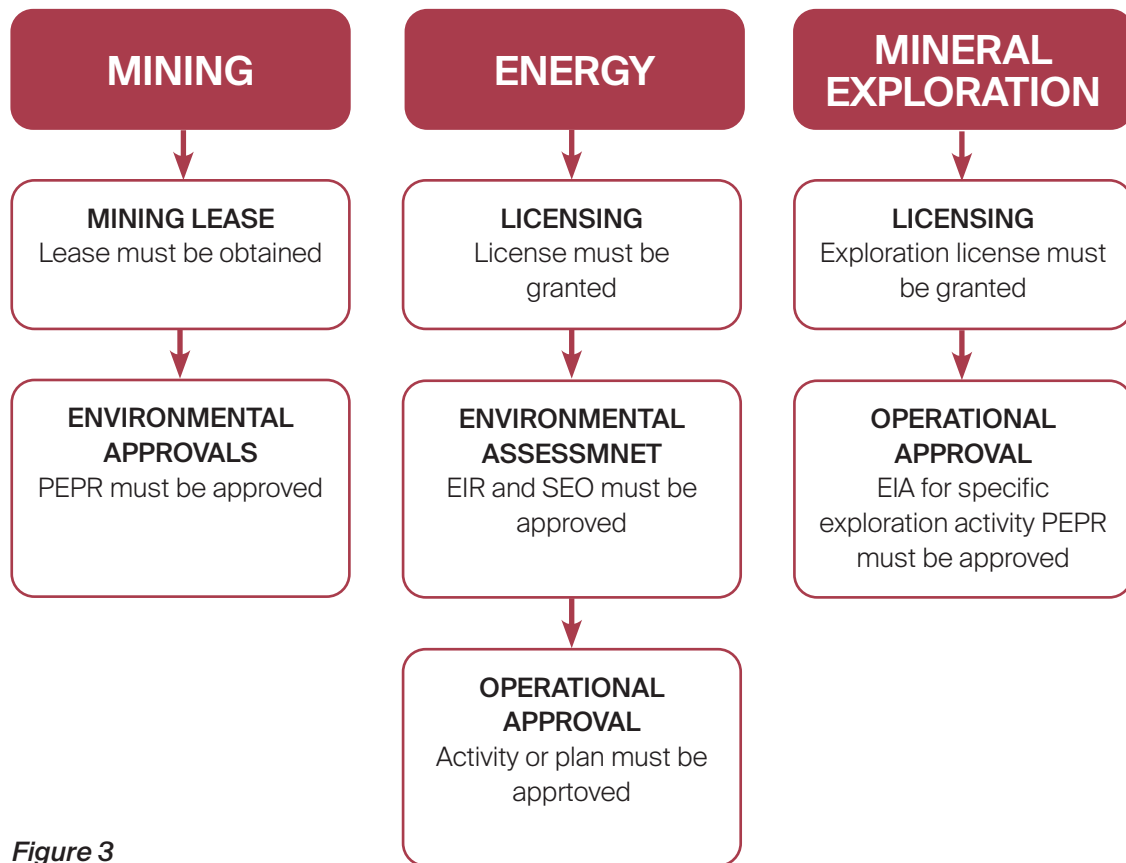


Figure 3

Weed-management responsibilities may vary depending on the approval pathway. Mining, energy, hydrogen and renewable projects are subject to different legislation and regulatory processes, and each has its own environmental assessment and land management requirements. This includes obligations related to biosecurity and the control of weeds such as buffel grass. Seek early advice from DEM, PIRSA or the relevant Landscape Board to understand your specific weed-management responsibilities and ensure compliance with all relevant conditions and standards.

In general, across all these pieces of legislation, the onus is on the licensee or tenement holder to ensure that they don't introduce or spread any weed, pest or pathogens because of activities regulated under these Acts. Licensees and tenement holders must ensure that the presence of weeds, pest animals or pathogens is consistent with or better than pre-disturbed conditions and adjacent land.

If a licensee or tenement holder determines through monitoring or audit that they've introduced or spread a weed, pest or pathogen, they should develop a site-specific monitoring plan in consultation with the DEM and Department of Primary Industries and Regions (PIRSA) immediately to control and eradicate the weed, pest or pathogen.



Planning and prioritisation

Effective buffel grass management starts with a clear understanding of why you want to manage it, along with the site conditions, risks and responsibilities that shape your approach. Planning helps connect your intent with practical control actions and follow-up.

The five-step process below provides a simple framework to guide planning and decision-making. It can be used at any scale – from localised infestations to coordinated, landscape-scale management. Use the planning cycle described in Figure 4 to guide your approach.

STEP 1

Assess your situation

Start by clarifying why you're managing buffel grass. This may include general land management, protecting biodiversity, reducing fire risk, preserving cultural or community values, or meeting legal responsibilities under biosecurity or permit conditions. Understanding your intent will help shape your objectives and guide decisions about where and how to act.

Next, assess the condition of the site and surrounding landscape. Consider the extent and density of buffel grass, vegetation types, terrain, access and any nearby assets or areas at risk. Map infestations, identify likely spread pathways, and note any barriers or constraints. Knowing the situation on the ground is critical to setting realistic and effective priorities – and for defining your objectives in Step 2.

STEP 2

Define objectives

Set your management objective based on the situation described in Step 1 – for example, preventing establishment, reducing impact, or protecting a specific site or asset. The South Australian declared plant policy for buffel grass sets regional strategic-management objectives that will inform the minimum requirements.

Within your management area, prioritise the areas or assets where intervention is most needed or most likely to succeed. These may include:

- new, small or outlying infestations
- areas with high risk of weed spread or that are a significant source of seeds
- high-value ecological, cultural or infrastructure areas.

Identify which control options are available and appropriate for your context. Different tools suit different conditions – manual control, fire or herbicide application may all be options but not all will be suitable for your site. Integrated approaches often work best. Consider seasonal timing, resource availability and site constraints when setting the scope and sequence of your work.





STEP 3

Develop your plan

Use the information gathered in Steps 1 and 2 to develop a clear, documented plan. Define your management goals, target areas and the control methods you intend to use. Describe the site and its context and identify any opportunities (e.g. planned burns, nearby programs) or constraints (e.g. access, labour, seasonal timing) that may influence implementation.

Include both a long-term strategy and a short-term action list, and ensure your plan is informed by best practice approaches relevant to your chosen methods and site conditions.

STEP 4

Implement your plan

Carry out your planned activities in accordance with the methods and priorities you've identified. Observe outcomes as you go, and adjust your approach if conditions change or new information emerges. Keep clear records of where, when and how control was undertaken – this will be critical for evaluating success and informing future planning.

STEP 5

Review your plan annually

Evaluate outcomes, monitor for regrowth or new incursions, and revise your plan as needed. Monitoring is essential to track progress and guide follow-up actions. Adaptive management is key to long-term success. The Monitoring and follow-up section has more information.

Suggested process and checklist for developing a weed-management plan for buffel grass

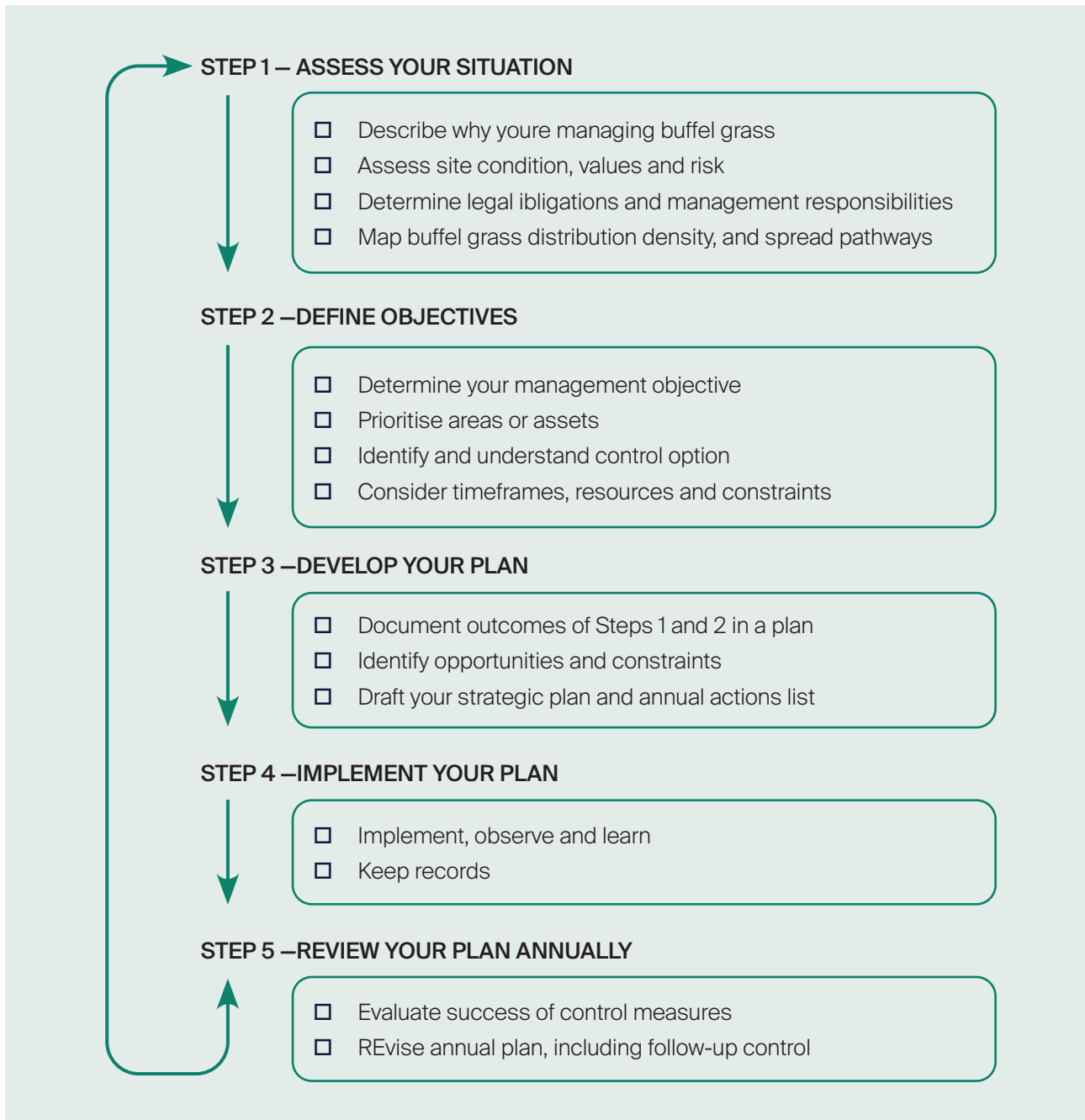


Figure 4





Mapping

Mapping the distribution and density of buffel grass is essential to understand the scale of infestations, plan strategic control efforts, and evaluate progress over time. Accurate spatial data helps land managers and decision-makers identify priority areas for action, assess risks to high-value assets, and allocate resources effectively. It also supports early detection and rapid response to new incursions.

To ensure consistency and enable data sharing across organisations and jurisdictions, align your mapping with the minimum dataset standards for the Biological Database of South Australia. These [standards](#) specify the core information required for each observation, such as

coordinates, date, observer details and the number of plants recorded. Using these standards allows your data to be integrated into the state's database and ensures it can be used to inform strategic planning and management at both regional and state levels.

Where possible, submit your data electronically using formats compatible with the Biological Database of South Australia to make integration easier. This collaborative approach to data sharing strengthens regional coordination, helps build an accurate picture of buffel grass extent across South Australia, and supports the long-term objectives of the South Australian Buffel Grass Strategic Plan.

Best practice management

Buffel grass is a challenging weed to control. Once established, it can be highly persistent and costly to manage, requiring long-term management commitments. Mature buffel grass plants are hard to kill due to their tough base and extensive root system, which enables them to regrow after cutting, grazing or burning.

The most cost-effective approach is to prevent establishment. However, there are effective ways you can manage infestations, particularly when control programs are tailored to site conditions, infestation stage, land use and management objectives. This is best achieved through integrated weed

management, which combines a range of control methods to achieve effective, long-term weed control.

Control options for buffel grass include:

- biosecurity measures
- early detection and control of new outbreaks
- manual removal of plants
- chemical control
- strategic grazing
- use of fire.

These methods are summarised in Table 3 and expanded on in the following pages.

Summary of control options available for buffel grass

CONTROL METHOD	ADVANTAGES 	DISADVANTAGES 	CAUTION 	TIMING 	INTEGRATE WITH 
Biosecurity measures	■ most cost-effective ■ prevents new infestations ■ relatively low cost compared to active control	■ cannot remove existing infestations ■ requires ongoing vigilance	■ even small breaches can lead to establishment ■ seeds are easily spread by vehicles, machinery, animals, people	■ ongoing, continuous requirement	■ applies across all control methods as a foundation
Early detection and control	■ enables rapid response to new incursions ■ reduces control effort and cost over time	■ requires regular time and effort	■ may miss plants if not timed or targeted well	■ late summer to early autumn or following events such as rainfall and fire	■ all other methods
Manual removal (chipping or hand pulling)	■ effective for small, isolated plants ■ immediate removal of individual plants ■ No chemical use	■ labour intensive ■ not feasible for large infestations ■ soil disturbance may promote germination	■ disturbing soil can stimulate seed bank germination ■ requires thorough removal of entire root system	■ year-round, but best before flowering and seeding	■ follow-up chemical control ■ monitoring ■ mulching
Chemical control (herbicides)	■ effective at larger scales ■ can target dense infestations ■ residual options provide longer control	■ multiple applications often required ■ off-target risks ■ herbicide resistance risk over time ■ Direct impacts in fauna, flora ■ Impacts on human health	■ correct application timing critical ■ environmental conditions affect efficacy ■ follow label and safety requirements	■ seasonal – often most effective during active growth after rain	■ fire (post-burn) ■ manual removal ■ grazing
Fire	■ reduces biomass and some surface seed ■ lowers herbicide volume required post-burn ■ can assist with landscape access for follow-up	■ does not kill mature plants ■ may stimulate fresh germination ■ risks to native species and infrastructure	■ fire behaviour unpredictable ■ requires permits and careful planning ■ can increase buffel dominance without follow-up	■ seasonal – typically dry season when fuel is available	■ chemical control (post-burn spraying) ■ grazing (to reduce fuel build-up) ■ monitoring

Table 3

Actions to prevent the introduction and spread of buffel grass



Planning site movements: Where possible, schedule operations to commence in clean areas and progress towards infested areas, reducing the risk of moving seeds into clean sites. Minimise movement and stay on formed tracks and roads



Vehicle and equipment hygiene: Inspect and clean vehicles, earth-moving equipment and machinery before moving between sites, particularly after operating in or near infestations (Figure 5)



Contractor hygiene: Require that contractors arrive with clean vehicles and equipment. Only engage contractors with good weed-hygiene practices and ensure they are aware of site protocols



Personnel hygiene: Encourage staff and contractors to clean clothing, footwear and personal equipment when moving between work areas



Inspect high-risk sites: Regularly inspect wash-down bays, parking and laydown areas, construction sites, exploration pads, material stockpiles and earthworks for buffel grass germination, particularly after rainfall events



Signage: Erect signage at key entry points to raise awareness and reinforce hygiene requirements for all site users



Training and awareness: Ensure staff can identify buffel grass, understand how it spreads, and are trained in appropriate weed-hygiene protocols



Purchase clean materials: Where relevant, request vendor declarations when purchasing fill, aggregate, building materials or other goods that may present a contamination risk

Table 4



BIOSECURITY MEASURES

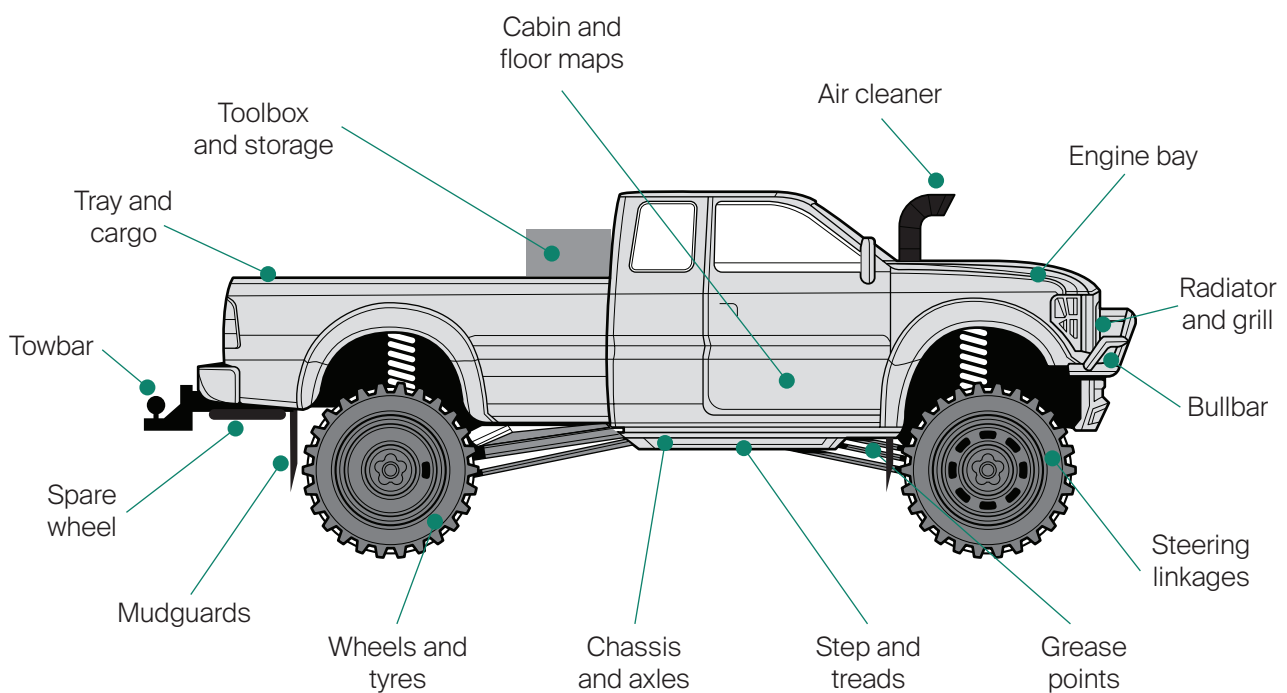
Property-level biosecurity involves preventing the entry, spread and establishment of new weeds, pests and diseases. It also means avoiding the unintentional spread of weeds, pests and diseases from your property to other properties (e.g. through contaminated produce or machinery).

Prevention through effective hygiene is the most cost-effective approach to managing buffel grass and avoiding the significantly greater costs of controlling established infestations.

Exploration, mining and infrastructure activities can inadvertently spread buffel grass, particularly through the movement of vehicles, machinery, equipment and materials between sites. Buffel grass produces large quantities of seeds that are readily dispersed by wind, water, animals, vehicles and clothing. The Spread section has more information.

Implementing robust hygiene measures is good practice and is a very effective way to prevent the introduction and spread of buffel grass. To ensure appropriate action is taken to prevent the introduction of buffel grass, follow the actions in Table 4.

Vehicle parts that require attention during clean-down procedures



1

START INSIDE

Cab, floor, seats, mats

2

WORK FROM TOP TO DOWN

Begin at the roofline and finish at the wheels

3

CLEAN YOUR EXIT

Clean the pad and yourself before driving off

Figure 5 (source: *National best practice management manual for gamba grass (Andropogon gayanus)*)



Managing spread via natural pathways

Spread by natural pathways – such as wind, water and animals – is harder to prevent but should still be considered when managing buffel grass. Seeds can be carried and deposited by runoff in areas like watercourses, floodouts and drainage lines, where they may become established and grow. Wildlife and feral animals can also carry seeds on their coats, particularly when moving through dense infestations. Wind may deposit seeds in sheltered areas, such as the base of shrubs, along fence lines, in soil depressions, or against rocks and other obstructions where wind speed drops. Monitor areas frequented by animals – including water points, resting sites and movement corridors – for new germinations. Early detection in these high-risk natural pathways increases the likelihood of effective control.



Vehicle hygiene is a critical step in spread prevention.



EARLY DETECTION AND CONTROL OF NEW OUTBREAKS

In addition to biosecurity measures, another important activity is regular surveillance to detect new incursions of pests, weeds and diseases. To detect new outbreaks of buffel grass, monitor high-risk sites and control plants before they set seed.

Areas to check during regular site activities include:

- fence lines
- property boundaries
- roads and tracks
- infrastructure (e.g. sheds, generators, tanks)
- flood-out areas and waterways
- areas surrounding previous infestations.

In addition to checking high-risk areas, consider the best time to be searching. This might include:

- shortly after significant rainfall (20–25 mm), when new seedlings emerge, existing plants reshoot, and active growth makes buffel grass easier to detect and control
- late summer to early autumn, following summer rainfall events (particularly in arid and semi-arid regions)
- immediately after fire, to monitor for germination and regrowth after fire
- during routine movement of vehicles and machinery, especially along high-risk pathways like roadsides, tracks and drainage lines
- before flowering and seed set, to support early intervention.

Record and map the locations of treated or removed plants so it's easy to return to the same location to search for new plants.



MANUAL REMOVAL

Manual (or physical) removal includes chipping, digging or grubbing out plants. It's effective for small, isolated infestations or in high-value ecological or cultural sites. Remove entire tussocks, including roots, and leave to dry out. Use tools such as hoes, mattocks and shovels to remove the plant. Removal is easiest when the soil is moist, as roots can be removed more easily and with less disturbance. Manual removal is labour intensive and may disturb the soil, potentially triggering further germination. If seed is present, remove and double-bag seed heads for appropriate disposal. Where feasible, bury plant material deeply on site to minimise transport requirements and reduce the risk of seed spread and subsequent germination. Follow-up monitoring and treatment after rainfall are essential.



Small isolated plants can be manually removed.





CHEMICAL CONTROL

Chemical control is an important tool to manage buffel grass, with a choice of herbicides and application methods available to suit a range of situations. It's most effective when used as part of an integrated management approach, supported by other techniques such as fire, physical control, hygiene and ongoing monitoring and follow-up.

Herbicide options

Two herbicides are commonly used in South Australia:

- **Glyphosate** is a systemic herbicide that is absorbed through actively growing leaves. It is fast-acting but doesn't provide residual (ongoing) control, so follow-up is required to control seedlings. It's non-selective, meaning it'll kill all plants it comes into contact with, so it's best suited for monocultures or situations where it's unlikely to impact on desirable vegetation. The choice of application method can also help reduce off-target impacts.

- **Flupropanate** is a slow-acting, residual herbicide absorbed primarily through the roots. It provides long-term suppression of buffel grass regrowth and seedlings, with residual activity lasting 18 months to 2 years depending on soil type and rainfall. It only affects grasses, leaving most broad-leaf plants and shrubs unharmed. Flupropanate can be applied when buffel grass is dormant and is especially useful in remote or inaccessible areas. Its residual effect may be reduced by fire, soil disturbance, or leaching – particularly in sandy soils.

These herbicides are registered for use under a minor-use permit (PER9792) issued by the Australian chemical regulator, the Australian Pesticides and Veterinary Medicines Authority. Permits (APVMA) have expiry dates – you can check if a permit is current via the [Permit search](#) webpage of the Australian Pesticides and Veterinary Medicines Authority website.

Permit users must follow all label and permit conditions, including restrictions around timing, rates and environmental safety. Always check for current permits, product registrations and safety instructions before use.

The [Weed control handbook for declared weeds in South Australia](#) has more information on herbicide options.



Spot spraying a roadside infestation.

Adjuvants

Adjuvants are additives that can be mixed with herbicides to improve their performance or target specific life stages of buffel grass. While not herbicides themselves, they play an important role in effective control programs. Consider the following adjuvants:

- **Pine oil:** destroys aerial and surface seed, helping reduce the seed bank. It's often added to herbicide mixes to target freshly fallen seeds or seeds lying on the soil surface.
- **Surfactants:** reduce water tension, helping spray droplets spread and stick to plant surfaces. This improves herbicide coverage and absorption.
- **Marker dyes:** assist with visual tracking of application, ensuring even coverage and reducing overlap or missed areas.

Always use adjuvants in accordance with product labels and any permit conditions.

Application methods

Several methods are available for applying herbicides to buffel grass (Table 5). The most appropriate method depends on the scale and density of the infestation, site access, environmental sensitivity and available equipment.

Herbicide application methods for buffel grass

BEST SUITED FOR	KEY CONSIDERATIONS
Isolated plants, small patches, high-value conservation sites	Low off-target risk. Requires water. Glyphosate or flupropanate
Buffel grass taller than surrounding vegetation	Low drift risk. Limited by terrain. Suitable for active growth
Uniform, accessible infestations on flat ground	High off-target risk. Avoid near sensitive vegetation
Large or remote infestations, rugged terrain	No water required. Lower drift. Slow-acting. Flupropanate only

Table 5

Site and environmental considerations

Choosing the right herbicide option depends on a range of site-specific and environmental factors that can affect both feasibility and risk. Consider the following when planning control activities:

- **Vegetation context:** Use low-drift, targeted methods such as spot spraying or wick wiping in or near high-value native vegetation. Don't boom or aerial spray in sensitive areas.

- **Soil type and drainage:** Flupropanate may leach in sandy soils or near waterways. Don't use on waterlogged soils or near riparian zones.
- **Terrain and access:** Many ground-based and vehicle-based controls may not be feasible in rugged or remote areas.
- **Proximity to infrastructure or built-up/populated areas:** This may limit the appropriateness of some types of herbicide applications (e.g. aerial application in a residential zone).





Timing

The effectiveness of chemical control is strongly influenced by timing:

- Only apply glyphosate when buffel grass is actively growing. In arid regions, this may occur opportunistically following rainfall, typically from late spring to early autumn.
- Flupropanate can be applied year round, including when buffel grass is dormant. Its residual properties means the herbicide remains active on the leaf, stem or soil surface

until sufficient rainfall washes it into the root zone for uptake. However, heavy rainfall shortly after application (e.g. more than 100 mm) may leach it beyond the effective zone and reduce long-term control – particularly on sandy or highly permeable soils. Don't apply when significant rain is forecast, and consider soil characteristics when planning treatment.

- Refer to the management calendar (Table 6) for general information on when to undertake control activities.

Optimal timing of chemical control

	SUMMER			AUTUMN			WINTER			SPRING		
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Burn + spray												
Spray flupropanate + glyphosate												
Spray flupropanate												
Flupropanate granules												
Spray glyphosate												
Spray pine oil												

Best time to apply control

Possible control under favourable conditions*

** Favourable conditions refer to when the plant is actively growing or under suitable climatic conditions.*

Table 6

Integration with other control methods

Chemical treatment is more effective when combined with other strategies. For example:

- Fire can reduce biomass and promote regrowth, improving glyphosate uptake. Use caution due the high flammability and fire-promoting nature of buffel grass.
- Grazing and slashing may help suppress seed production and encourage fresh leaf growth before spraying.
- Spread prevention through vehicle and machinery hygiene, buffer zones and rapid response to new incursions is essential to support chemical efforts.

Legal and safety obligations

All chemical use must comply with legal and safety requirements to ensure responsible, effective and lawful application. Be sure to:

- Only use herbicides registered for buffel grass under current permits (e.g. PER9792).
- Wear appropriate personal protective equipment.
- Follow all label and permit directions for mixing, application and withholding periods.
- Keep accurate records of herbicide use.
- Follow prescribed withholding periods for any herbicides used prior to the introduction of grazing animals.



Buffel grass growth after fire.





MONITORING AND FOLLOW UP

Ongoing monitoring is essential to assess herbicide effectiveness and prevent reinfestation. Ensure you:

- Revisit treated sites to check for regrowth or seedling emergence.
- Plan follow-up treatments after rainfall, fire or other germination events.
- Monitor seasonal conditions to anticipate periods of active growth.
- Record treatments and outcomes to inform future decision making.

Follow-up is critical to the success of any buffel grass control program. It ensures that any plants missed during initial treatment, or new seedlings that have emerged from the seed bank, are detected and removed. Regular follow-up reduces the chance of reinfestation and prevents treated areas from becoming re-established. Ideally, follow up at least once per year, with additional checks after significant rainfall events when new germination is most likely. Dense or large infestations should be monitored and treated multiple times throughout the growing season. Consistent follow-up greatly increases the likelihood of long-term success.



Buffel grass seeds ready to germinate



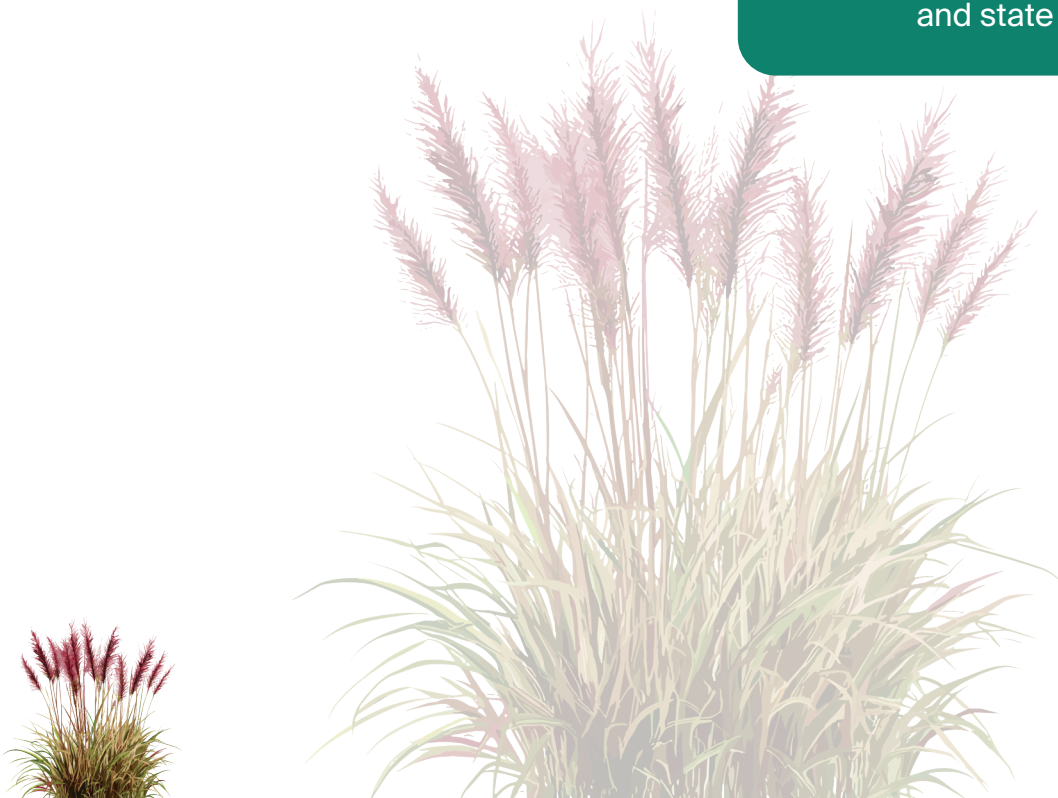
Reporting

Reporting is a key component of buffel grass management. In addition to meeting obligations set by the DEM, landholders and industry operators are encouraged to share buffel grass distribution and control data with relevant landscape boards, particularly when outlier infestations are detected in areas designated for destruction under Zone 3 management objectives (see page 21).

Additionally, in some regions – specifically Kangaroo Island, Hills and Fleurieu, Limestone Coast and Murraylands and Riverland – the *Landscape South Australia Act 2019* requires mandatory notification of the presence of buffel grass.

Timely reporting of these records can trigger targeted follow-up actions by regional authorities or land managers, ensuring that newly detected infestations are promptly addressed before they become established. Early intervention can prevent further spread into surrounding areas, reduce long-term control costs, and limit impacts on priority assets.

Additionally, shared records contribute to broader surveillance and mapping efforts, helping build a more accurate understanding of buffel grass distribution across the landscape. This, in turn, informs strategic planning, resource allocation, and coordinated management at local, regional and state scales.



Further information

Legal obligations

REGION	STATE MANAGEMENT ZONE	REGIONAL ACTIONS
Alinytjara Wilurara (AW)	APY Lands: Zone 1* (Manage weed) MT Lands: Zone 3* (Destroy infestations)	Manage weed (APY Lands) Destroy infestations (MT Lands)
Eyre Peninsula (EP)	Zone 3* (Destroy infestations)	Destroy infestations
Green Adelaide (GA)	Zone 3* (Destroy infestations)	Destroy infestations
Hills and Fleurieu (HF)	Zone 3* (Destroy infestations)	Destroy infestations
Kangaroo Island (KI)	Zone 3* (Destroy infestations)	Destroy infestations
Limestone Coast (LC)	Zone 3* (Destroy infestations)	Destroy infestations – regional alert
Murraylands and Riverland (MR)	Zone 3* (Destroy infestations)	Destroy infestations
Northern and Yorke (NY)	Zone 2* (Protect sites) Zone 3* (Destroy infestations)	Protect sites Contain spread (native vegetation in Lower North and Yorke)
South Australian Arid Lands (SAAL)	All districts except Marla-Oodnadatta: Zone 2* (Protect sites) Marla-Oodnadatta District: Zone 1* (Manage weed)	Manage weed (Marla-Oodnadatta District) Protect sites (all districts except Marla-Oodnadatta)

* Refer to Figure 2 Buffel Grass (*Cenchrus ciliaris*) in South Australia on page 22.

Key contacts

ORGANISATION	ADVICE ON
Regional landscape boards	Identifying and managing weeds, managing roadside weeds
PIRSA's Biosecurity Division	Identifying and managing weeds and landholder responsibility, plant policies, chemical use and training
Australian Pesticides and Veterinary Medicines Authority	Herbicide regulation, minor-use permits
Department for Energy and Mining	Mining and energy licensing, approval and regulation, including weed control

Training

TRAINING TYPE	PROVIDER
Chemical user training	Various providers
Vehicle hygiene	National training register All states training Find training directory



Key information sources

DOCUMENT	INCLUDES INFORMATION ON						
	ID	IMPACTS	BIOLOGY	DISTRIBUTION	LEGAL REQUIREMENTS	MANAGEMENT	STRATEGIC PLANNING
South Australian buffel grass strategic plan 2019–2024	✓	✓	✓	✓	✓	✓	✓
Alinytjara Wilurara buffel grass operational strategy	✓	✓	✓	✓		✓	
Declared plant policy for buffel grass		✓			✓		✓
Buffel grass factsheet – general	✓	✓	✓	✓			
Buffel grass factsheet – identification	✓						
Buffel grass factsheet – control			✓			✓	
Buffel grass factsheet – hygiene						✓	
Identifying Buffel Grass – interactive 3D model	✓						
Weed control handbook for declared plants in South Australia						✓	
Buffel grass threat abatement advice		✓			✓		✓
Mineral regulatory guidelines					✓		
Biosecurity protocols for exploration and mining					✓	✓	✓
Licensing and approval processes – mining					✓	✓	
Licensing and approval processes – energy					✓	✓	
Licensing and approval processes – hydrogen and renewable energy					✓	✓	





Bibliography

[Alinytjara Wilurara buffel grass operational strategy 2018–2023](#)

(Department for Environment and Water, South Australian Government).

[South Australia buffel grass strategic plan 2019–2024: a plan to reduce the weed threat of buffel grass in South Australia](#) (South Australian Government).

[Biosecurity SA \(2019\) South Australia Buffel Grass Strategic Plan 2019–2024:](#)

A plan to reduce the weed threat of buffel grass in South Australia.

[Buffel grass management in Indigenous communities](#)

(presentation at 21st Australasian Weeds Conference).

[Buffel grass \(*Cenchrus ciliaris*\)](#)

(Biosecurity Queensland, Queensland Government).

[Buffel grass fact sheet](#)

(Northern and Yorke Landscape Board, South Australian Government).

[Buffel grass control factsheet](#)

(Department of Primary Industries and Regions, South Australian Government).

[Integrated buffel grass management plan for the Great Victoria Desert 2018–2023](#)

(Desert Support Services).

[Declared plant policy for buffel grass](#)

(South Australian Government).

[Buffel grass management strategy: Central Australia 2024–2030](#)

(Department of Environment, Parks and Water Security, Northern Territory Government).

Acknowledgement of Country

The Department for Energy and Mining acknowledges Aboriginal people as the First Nations Peoples of South Australia. We recognise and respect the cultural connections as the traditional owners and occupants of the land and waters of South Australia, and that they continue to make a unique and irreplaceable contribution to the state.

FURTHER INFORMATION

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