



**TOP END
CONSERVATION MANAGEMENT**

Litchfield Council Integrated Weed Management Plan 2021–2026



**LITCHFIELD
COUNCIL**



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ABBREVIATIONS

BNT	Bushfires NT
CLE	Crown Land Estate
DEPW	Department of Environment Parks and Water Security
DPIL	Department of Planning, Infrastructure and Logistics
ERA	Emergency Response Area
GGA	Gamba Grass Army
GGR	Gamba Grass Roots
GIS	Geographic Information System
LNT	Landcare NT
LC	Litchfield Council
LFW	Land for Wildlife
NT	Northern Territory
NTF	NT Farmers
NTFRS	Northern Territory Fire & Rescue Service
NTG	Northern Territory Government
NTL	NT Landcare
TECM	Top End Conservation Management
TNRM	Territory NRM
TWP	Territory Wildlife Park
WMB	Weed Management Branch

1. Background

The Litchfield Council (LC) municipality covers over 3,100 sq. km of the Greater Darwin rural area and the major priority weed infestations are generally found concentrated in smaller areas throughout this jurisdiction. These include the following Litchfield Council owned land parcels: 75 LC excised land parcels (of which 48 are greater than 3 ha and identified as significant in the LC Fire Management Plan); 8 drainage easements (numerous more managed by other stakeholders); and some 800 kilometers of road reserves with the majority of them a priority for weed management. The LC road reserves form a major network through the municipality and can act as weed spreading wicks if not managed properly.

There is very little undisturbed land in the LC municipality with many rural subdivisions, major and secondary roads, drainage and agricultural land, all of which are conducive to weed invasion. Following a Weed Management Branch (WMB) aerial survey of the LC municipality in 2016 it was observed that there were a range of weed infestations from relatively clean to relatively infested areas. LC excised land often sits in the middle of rural sub-divisions and if infested with weeds can also act as a wick along wetland corridors.

Well managed LC reserves and adjacent properties with minimal weed infestations are easier and cheaper to manage in the long term.



2. The conservation significance of the Litchfield Council Municipality

The Litchfield Council municipality has many areas of conservation significance. These include International Sites of Conservation Significance, Priority Environmental Management Areas, Parks and Reserves and EPBC listed species/habitat. The 3 sites of international conservation significance are Darwin Harbour, Howard Sand Plains and Shoal Bay.

The majority of LC excised land are wetlands, riparian and natural drainage areas and are classified as Priority Environmental Management Areas under the Litchfield Subregional Land Use Plan 2016 (Planning Commission 2016).

See Appendix 1 for Figure 1 Map showing Priority Environmental Management Areas and Figure 2 Map showing Sites of International Conservation Significance in the Greater Darwin Area (Clark et al., 2017)



3. Introduction

3.1 The new weed management plan

Litchfield Council's (LC) current weed management plan expired at the end of 2020. During the plan's tenure there were a number of changes which needed to be addressed in the new plan. These included relevant changes to weed management legislation and community concern about major weeds such as Gamba Grass becoming a threat to lives, infrastructure and the environment.

Top End Conservation Management (TECM) was invited by LC on the 3rd of September 2020 to tender for the development of a 5 year weed management plan. TECM was awarded the contract on the 1st of October 2020.

3.2 The Council

The activities and decisions of LC have a significant impact on the health of local and regional ecosystems and the community they serve. LC is responsible for delivering a variety of services to the public as well as protecting, conserving and enhancing the natural environment. Council acknowledges that, to meet their statutory and community obligations, the principals of ecological sustainability development (ESD) must be applied across all operations and fostered in the community. They are committed to maintaining or enhancing the health of their natural environment and the well-being and equity of their community for current and future generations. The Council's operations fall under the framework of the following plans: Litchfield Council 2018 - 2022 Strategic Plan, Litchfield Council Community Engagement Strategy and Action Plan 2018 - 2021, Litchfield Council Fire Management Plan (2020-2025) and Litchfield Council Road Assets Management Plan (2019).

LC is subject to compliance through the NT Weed Management Act just like any other landholder. The Council is fully compliant with the new Gamba grass Management Plan and there has been incremental improvement over recent years (WMB *pers. comm.* October 27th 2020).

The recent Royal Commission into Bushfires identified Gamba Grass (*Andropogon gayanus*) as the biggest fire threat issue in the NT and recognised that it is costing the community more every year. They have recommended more resources to combat this growing threat (P. Rubie *pers. comm.* October 27th 2020). Gamba Grass is one of the major target species on LC managed land

3.3 The Mobile Workforce

Council employs a mobile work force (MWF) of skilled operatives to provide slashing and weed control for Council's land, road reserves and easements. The MWF completes two rounds of spraying and slashing leading up to and during the wet season. Spraying is approximately 2-4 weeks ahead of the grass cutting. Teams work simultaneously from the most northern and the most southern points in our

municipality and meet up in Humpty Doo to finish round one. They then split up and commence it all again for round two. Dates are estimated due to weather conditions sometimes delaying operations. The Council has a process for the community to notify them about something in regards to weeds, slashing or sign posts that needs council attention.

3.4 Current LC weed management strategies

Weed management on Council excised land, road reserves and drainage easements is carried out by the Mobile Workforce (MWF). The MWF currently has 5 full time staff and 5-6 casuals. It has 4 spray units, an assortment of tractor slashers, a truck and trailer. The budget is circa \$156,000 per annum which includes wages and salaries for the spraying component.

The MWF do a good job complying with the NT Government legislation under the Weed Management Act 2001 which is addressing the growth and spread of priority weeds. In recent times there has been a gradual improvement in weed management year by year in recent times (WMB *pers. comm.* October 27th 2020).

Current management of weeds on excised land, road reserves and drainage easement include the following:

- Current target weeds include: Gamba Grass (*Andropogon gayanus*), Annual Mission Grass (*Cenchrus pedicellatus*), Perennial mission grass (*Cenchrus polystachion*), Olive Hymenachne (*Hymenachne amplexicaulis*), Hyptis (*Mesosphaerum suaveolens*), Mimosa (*Mimosa pigra*), Snake weeds (*Stachytarpheta spp.*) and Grader Grass (*Themeda quadrivalvis*).
- Weeds are spot sprayed over a period of 4.5-5 to 7 months, starting in the early wet season before areas become too wet – 1st round starts in October and goes for 2.5 to 3 months season dependent.
- The 1st round of slashing starts 3- 4 weeks after spraying (usually mid-late November).
- The 2nd round of spraying of weeds is generally February - April and is more targeted at spotting weeds and follow up bulk/ firebreak spraying where accessible.
- The 2nd round of slashing occurs from March to the end of June.
- In between round 1 and 2 the MWF attempts to spray and slash the 4-10m firebreaks and the 15m legislative requirements around the internal perimeters on excised land.
- 4-10m firebreaks are sprayed and slashed on excised land boundaries
- Current herbicides and adjuvants used include:
 - Glyphosate aquatic approved herbicide is used for wetland areas and near drainage lines;
 - Amicide for Hyptis;
 - Sulfomac 750 WG herbicide is mixed with Glyphosate for roadside furniture/signs etc. It is not used when close to a wetland. Sulfomac is used for it's residual properties around furniture and is only used in the first round of spraying when, generally, there is no surface water;

Metsulfuron is used for extra penetration in the treatment of woody weeds;
and

- Current surfactants: Outright 700, past Coola and LI-700.

The MWF have in the past sprayed weeds on land adjoining their excised land and road reserves including Vacant Crown Land (VCL), main roads and rural property boundaries. One of the ramifications of recent insurance amendments means that LC can only spray weeds on their own land.

There are a few problem areas where some farms adjoin LC excised land. Gamba grass is a big problem on some of the farms and provide a weed seed source in some cases. Spray drift from weed control is also an issue for the farmers' crops.

In regards to compliance for other properties in the LC, the Council informs WMB and Bushfires NT/NTFRS of properties adjoining LC excised land, easements and road reserves. This is done mostly through the Gamba Action Program and compliance officer. This is not so much the case with fire management issues, bar general conversation with fire management authorities about known problem blocks.

For the prevention of weed spread when slashing, the equipment is blown down and seed bagged up at the end of each road, with increased focus during seeding time in April-May. The sprayers then come along and spray blow down areas.

LC are aware that it would be better if areas were slashed before they seeded, but this is not always practicable due to fast growth rates of weeds and limited resources. Areas are slashed twice in the season and weed species will sometimes seed in between being cut.

The SWMS are reviewed annually prior to the weed management season. Spraying logs are filled in daily and if conditions changes a Job Safety Analysis is undertaken. All vehicles and chemical storage facilities have Safety Data Sheets which are filled in as deemed appropriate.

4. Project Purpose

4.1 Project Goals

- Provide a blue print to guide Litchfield Council's weed management program to mitigate against and manage weed infestations on Council land.
- Provide a clear guide for up to date, accountable, best practice weed management for all priority weeds that affect Litchfield Council land.
- Provide a guide for Litchfield Council to implement first class weed management which the Council is proud of and happy to share with the community.

4.2 Project Objectives

- Produce a comprehensive 5 year Strategic Weed Management Plan for 2021-2026.
- Identify weed control responsibilities and specific threats in the municipality for all roads, drainage and excised lands and the wider community.
- Provide opportunities for partnerships and relationships to encourage coordinated weed management with the community, organisations, and stakeholders.
- Identify local priorities for action consistent with regional, state, and national priorities.
- Ensure the relevant systems and programs for weed management are developed to meet all relevant Federal, NT and local government statutory and regulatory requirements and best land and environment management practices.
- Ensure the relevant systems and programs for weed management for the LC municipality are developed in context of a wider weed management system for the municipality.
- Provide relevant information for the production of an Annual Weed Management Action Plan.
- Ensure that Council undertakes Weed Management responsibilities considering Work, Health and Safety and duty of care to Council staff, members of the community and wildlife.

5. Project scope

5.1 Data Collection and Analysis

Discuss with Litchfield Council, Weed Management Branch etc. weed occurrence, current weed management planning, mitigation and control activities, data management, safety procedures and management results to date. Collate this information. Consult with relevant government and community organisations/groups to determine current and planned management activities, collaboration opportunities and priority areas for targeted actions. Conduct field visits to survey target weed species on excised land, road reserves and drainage easements.

5.2 Review of Relevant Plans, Legislation and Council Procedures

Review all relevant: Federal, NT and local government regulations; the current Litchfield Council Weed Management Plan; NTG updated 2020-2030 Gamba Grass Strategic Plan; other Environmental Management Plans (including survey, mapping and reports); Litchfield Council procedures and policies; and other relevant Environmental Management Plans for Litchfield Council. Ensure actions included address Councils obligations.

5.3 Gap and Risk Analysis

Undertake: a gap analysis on current Management Plans and treatments; and a risk analysis of each site to inform outcomes and priorities.

5.4 Produce plan and annual action plan

In close liaison with Litchfield Council staff formulate the plan structure. Produce a Weed Management Plan as per Litchfield Council scope of works.

5.5 Produce an Annual Action plan

Provide a detailed list of management actions required to enable any improvements or changes to weed management on Litchfield Council land. This will include treatment priorities and specified targets that work in conjunction with Councils Fire Management Plan including recommendations and estimated costs for 2021-2026 treatments. This will also include a reference of current processes that have been reviewed and a reference of external sources for suggested recommendations.

5.6 Assumptions

Litchfield Council provided the following information and services:

- Works to date from existing plan.
- Access to Near maps/aerial imagery.
- Cadastre information indicating relevant properties.
- Senior staff member for property inspections to highlight relevant issues.
- Access to the Council Chambers Room for stakeholder meetings.
- Introduction to managers of Freds Pass and McMinns Lagoon Reserves.

6. Approach

Please see details of data collection, analysis, mapping and presentation; stakeholder meetings; and review, collation, analysis and distilling of data from relevant plans, legislation and meetings in Appendix 2.

7. Applicable legislation & regulatory requirements

7.1 Weed Management

The Council is obligated to meet relevant legislative and other responsibilities under the following:

7.1.1 National

Weeds of National Significance (WONS)

The following weeds above are WONS: Gamba Grass (*Andropogon gayanus*), Olive Hymenachne (*Hymenachne amplexicaulis*), Bellyache Bush (*Jatropha gossypifolia*) and Mimosa (*Mimosa pigra*).

Threat Abatement Plan (TAP) to reduce the impacts on northern Australia's biodiversity by the five listed grasses

Under the EPBC Act, the Australian Government develops TAPs and facilitates their implementation. The EPBC Act requires the Australian Government (AG) to implement TAPs to the extent to which they apply in areas under AG control and responsibility. In addition, AG agencies must not take any actions that contravene a TAP. Where a TAP applies outside AG areas in states or territories, the AG must seek the cooperation of the affected jurisdictions, with a view to jointly implementing the TAP.

There is a National TAP to address the key threatening processes (KTP) ie, 'Ecosystem degradation, habitat loss and species decline due to invasion of northern Australia by introduced Gamba Grass (*Andropogon gayanus*), Para Grass (*Urochloa mutica*), Olive Hymenachne (*Hymenachne amplexicaulis*), Mission Grass (*Cenchrus polystachion*) and Annual Mission Grass (*Cenchrus pedicellatum*) This KTP was listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) in 2009 (Australian Government 2012).

There are no legislative requirements at the Federal level, it is more about cooperation with other jurisdictions to manage these invasive species.

7.1.2 Northern Territory

7.1.2.1 Declared weeds

In the Northern Territory, a declared weed is a species of plant identified for eradication, control, or prevention of entry in all or part of the Territory under section 7 of the Northern Territory [Weeds Management Act 2001](#) (the Act). The general duties and specific requirements relating to declared weeds are described in section 9 of the Act.

A weed may be declared as:

Class A	To be eradicated
Class B	Growth and spread to be prevented
Class C	Not to be introduced to the Territory

All Class A and Class B weeds are also considered to be Class C weeds.

Weed management plans are statutory documents designated under section 10 of the Act and describe additional legal requirements for high risk declared weeds. These plans establish the legal requirements and management actions to be undertaken by all owners and occupiers of land and all persons in the Northern Territory.

Conducting land management practices in accordance with this plan will secure compliance with the requirements of the Act (NTG 2019).

7.2.1.2 Class A and B Weeds

The NTG has 6 statutory weed plans relevant to the LC municipality which outline **minimal** legal requirements for control. These plans are for the following Class A (and B) declared weeds: Gamba Grass (*Andropogon gayanus*), Cabomba (*Cabomba carolina*), Bellyache Bush (*Jatropha gossypifolia*), Mimosa (*Mimosa pigra*) and Chinee Apple (*Ziziphus mauritiana*) and the following Class B weeds: neem tree (*Azadirachta indica*) and Grader Grass (*Themeda quadrivalvis*). The area to which the declaration applies is all of the Northern Territory unless otherwise indicated. For example Gamba Grass is to be contained and controlled by actively managing infestations outside of the A zone (LC is outside the A zone).

The following species are also declared Class A (and B) weed species: Barleria (*Barleria prionotis*) and Thatch Grass (*Hyparrhenia rufa*). These species do not have statutory weed plans but need to be eradicated under the Act.

The following species are also declared Class B weed species: Perennial Mission Grass (*Cenchrus polystachion*), Olive Hymenachne (*Hymenachne amplexicaulis*), Hyptis (*Hyptis suaveolens*), Candle Bush (*Senna alata*), Sicklepod (*Senna obtusifolia*), Coffee Senna (*Senna occidentalis*), Spinyhead Sida (*Sida acuta*), Flannel Weed (*Sida cordifolia*), Paddy's Lucerne (*Sida rhombifolia*), Snake Weeds (*Stachytarpheta spp.*). These species do not have statutory weed plans but growth and spread needs to be prevented under the Act.

7.2.1.3 Alert Weeds

An alert weed is a species not yet fully naturalised in the region, that has the potential to have a high level of impact to the region should it become established, and the likelihood of the species naturalising and spreading in the region is perceived to be high. Alert weeds are deemed to be eradicable in the true sense of the term "eradication" (Darwin Regional Weed Management Plan 2015-20).

Cabomba (*Cabomba carolina*) and Water Hyacinth (*Eichhornia crassipes*) are Class A species on the Alert list and have previously been found in the Litchfield Council municipality. When weed reports go to the WMB they are referred onto the Gamba Compliance Officer (weed and fire). Ninety percent of the reports are not from LC land (WMB 2020 *pers. comm.* 27th Oct).

7.2.1.4 Weed Management Plan Gamba Grass 2020 – 2030

Under the Weed Management Plan for Gamba Grass, land owners and managers have legal obligations to control gamba grass if their property is in the Control Zone (B), which the Litchfield Council is in. This includes all excised land parcels in the Litchfield Council municipality.



Figure 1 Map showing Gamba grass Control Zone in the Top End

In order for LC to be a good corporate citizen it needs to address the following relevant goals and objectives from the Weed Management Plan Gamba Grass 2020 – 2030:

Aim, goals and objectives

Goal 2 Contain and control gamba grass by actively managing infestations across the Class B zone and preventing spread into new areas

Objectives pertinent to the ASRAC management area:

- 2a. Reduce seed production.
- 2b. Implement weed hygiene measures to reduce gamba seed spread.
- 2c. Reduce gamba grass outliers at a land parcel and landscape scale.
- 2d. Prevent gamba grass spreading into clean areas.
- 2e. Reduce gamba grass abundance and density in the Class B zone.
- 2f. Reduce gamba grass presence around landholder infrastructure.

Goal 3 Protect priority environmental and cultural assets from the impacts of gamba grass

Objectives pertinent to the ASRAC management area:

- 3a. Identify key environmental and cultural assets at risk of being impacted by gamba grass and incorporate into relevant Weed Management Branch, stakeholder and land manager regional plans, strategies and compliance programs.

Goal 4 Increase community capacity and willingness to participate in gamba grass management

Objectives pertinent to the ASRAC management area:

- 4a. Engage with the community and obtain a high level of public support for gamba grass management action.

Figure 2 Goals and objectives relevant to the LC

General duties for all land owners and occupiers

General duties included under the Act for land owners and occupiers in accordance with Section 9(1) are as follows:

All land owners and occupiers must take all reasonable measures to prevent the land being infested with a declared weed. Reasonable measures include:

- Destroying all outlier Gamba Grass plants and infestations as a priority.
- Ensuring that control measures used to destroy gamba grass are effective. Not allowing Gamba Grass to establish on stockpiles of any description.
- Preparing and implementing a property weed management plan.
- Recording Gamba Grass survey, control and distribution information and providing it to the Weed Management Branch upon request.

Note that burning, grading, slashing and grazing management methods do not destroy Gamba Grass. These methods can be useful for managing Gamba Grass fuel loads and minimising seed production. To destroy Gamba Grass these methods must be implemented in conjunction with other control methods (e.g. herbicide application, hand pulling). Any burning conducted must be done in accordance with any required permits.

All land owners and occupiers must take all reasonable measures to prevent a declared weed or potential weed on the land spreading to other land. Reasonable measures include:

- Not allow Gamba Grass to spread into clean areas or adjoining land.
- Implement all gamba grass control as required by this plan prior to seeding. Not use Gamba Grass contaminated soil stockpiles as clean fill or topsoil.
- Prepare a weed spread prevention plan in accordance with Preventing Weed Spread is Everybody's Business (Northern Territory Government 2015).
- Destroy Gamba Grass in areas to be disturbed by machinery, vehicles or any other human means prior to flowering and seeding.
- Not move any machinery or transport materials contaminated with gamba grass seed off site or into clean areas.
- Within 14 days after first becoming aware of a declared weed that has not previously been, or known to have been, present on the land, notify a weed management officer of the presence of the declared weed.

All persons and organisations with Gamba Grass on land they own or occupy must comply with the management requirements in the following relevant Tables to achieve compliance with this plan. All actions with timeframes based upon commencement of the plan are to be implemented from the gazettal date.

Requirements for land owners and occupiers by parcel size and use

Adjoining land parcels owned by the same entity may be treated as one parcel for the purpose of determining the required management actions. This is to provide an achievable framework that ensures resources are strategically applied across multiple parcels in this situation.

Table 1: Class B Zone - Land parcels (<3 Ha) Control growth and spread

1.1	Establish and maintain by chemical, mechanical or physical means, a gamba grass free buffer on all land parcels, a distance of 15 m in width along the inside of the land parcel boundaries, around infrastructure, and on both sides of tracks and roads prior to seeding each year.
1.2	All gamba grass plants are destroyed by July 2023
1.3	Detect and destroy all gamba grass regrowth prior to seeding (July 2023 – July 2025).

Table 2: Class B Zone - Land parcels (3-140 Ha) Control growth and spread

2.1	Establish and maintain by chemical, mechanical or physical means, a gamba grass free buffer on all land parcels, a distance of 15 m in width along the inside of the land parcel boundaries, around infrastructure, and on both sides of tracks and roads prior to seeding each year.
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Table 3: Class B Zone - Land parcels (140ha +) Control growth and spread

3.1	Establish and maintain by chemical, mechanical or physical means, a gamba grass free buffer on all land parcels, a distance of 15 m in width along the inside of the land parcel boundaries, around infrastructure, and on both sides of tracks and roads prior to seeding each year.
3.2	Undertake annual monitoring and control activities and weed spread prevention activities to ensure gamba grass free areas remain gamba grass free

Table 4: Transport Corridors

4.1	For all transport corridors, establish and maintain by chemical, mechanical or physical means, a gamba grass free buffer of 15m in width on both sides of tracks and roads prior to seeding each year.
4.2	Establish and maintain by chemical, mechanical or physical means, a gamba grass free buffer of 500m within the Class B zone when the Class B zone adjoins a Class A zone boundary, by January 2022.

Table 1 Gamba Grass control requirements for land owners/occupiers by parcel size and use

*Section 7.2.1.4 above is taken from the Weed Management Plan Gamba Grass 2020 – 2030.

7.1.3 Darwin region

Darwin Regional Weed Management Plan 2015 -2020.

Aim: To protect the Darwin region’s economy, community and environment from the adverse impacts of weeds by:

- Providing clear regional priorities; and
- Providing clear, achievable and measurable regional management actions.

Legal requirements of land holders

All landholders must take all reasonable measures to prevent their land being infested with a declared weed and prevent a declared weed on their land spreading. All landholders must meet the management requirements of the Weeds Management Act (the Act) including Statutory Weed Management Plans in order to secure compliance with the Act.

The purpose of the Act is:

- a. to prevent the spread of weeds in, into and out of the Territory and to ensure that the management of weeds is an integral component of land management in accordance with the Northern Territory Weeds Management Strategy 1996 – 2005 or any other strategy adopted to control weeds in the Territory;
- b. to ensure there is community consultation in the creation of weed management plans; and
- c. to ensure that there is community responsibility in implementing weed management plans. The Plan supports landholders in their obligations to manage weeds on their land.

The new Darwin Regional Weed Management Plan is planned to be released early in 2021. The plan outlines priority species and pathways for management.

7.2 Fire Management

As with other land managers in the NT, LC has obligations to manage and reduce its exposure and risks to bushfire and other natural hazards. Fire, including bushfire, is a natural part of the Northern Territory landscapes and environment, and like most

natural events, it must be managed to prevent impacts on property, industry and, in extreme cases, human life (Ten Rivers 2020).

The LC municipality comes under the jurisdiction of two NTG fire management authorities, the NT Fire and Rescue Service (NTFRS) and Bushfires NT (BNT). There are also legislative instruments that help guide bushfire mitigation and planning. Within Emergency Response Areas (ERA), the NTFRS operates under the Fire and Emergency Act 1996. The Bushfires Management Act 2016 provides the framework for NT Bushfires to operate within to manage bushfire in areas outside the ERA (Ten Rivers 2020).

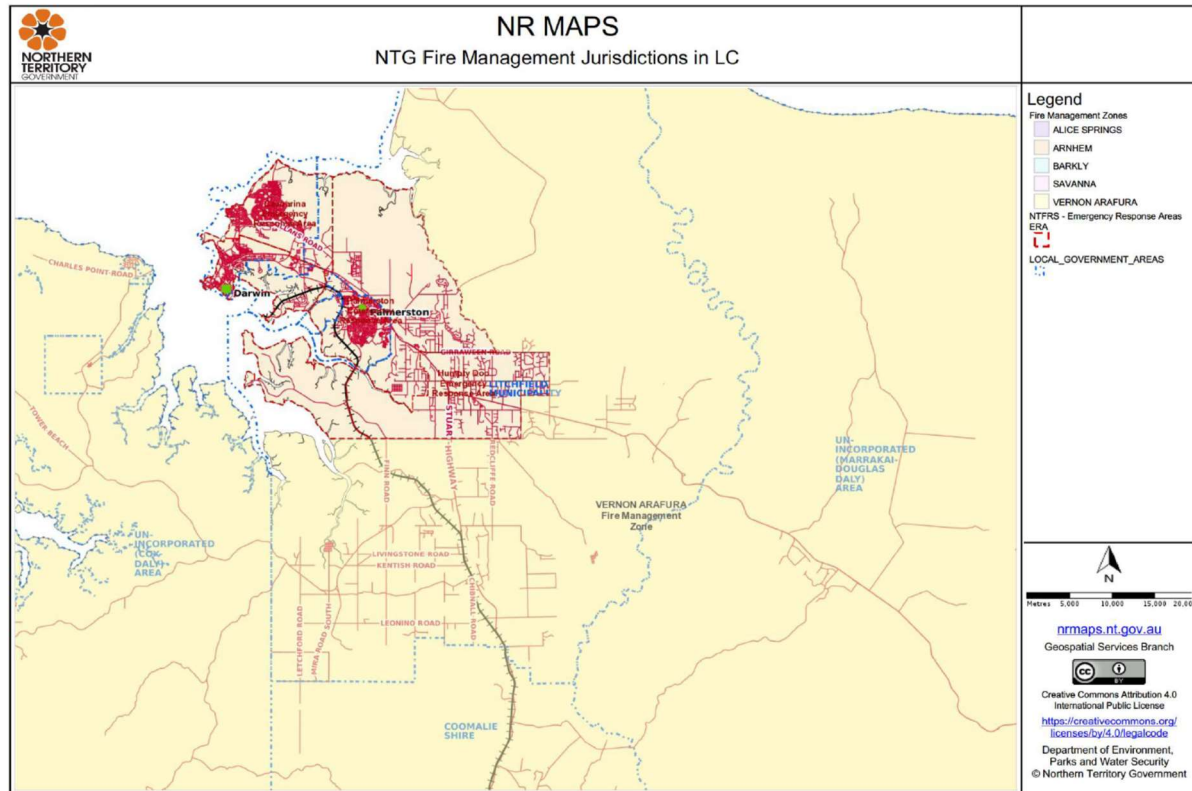


Figure 2 Map showing NTFRS Emergency Response Area (ERA) and the Bushfires NT Vernon Fire Management Zone in the LC

Fire on LC land needs to be managed (in conjunction with weed control measures) to protect property, infrastructure, the environment and human life. There are risks associated with managing these lands. If a fire starts on LC land and spreads into neighbouring properties the Council is liable. The Council now has a fire management plan for its excised land and is currently actioning priorities. A Permit to Burn is required by the NTFRS year round within their ERA's.

According to legislation, the firebreak must: (a) be at least 4 m wide on both sides of the fenceline; and (b) consist of one or more of the following: (i) bare earth; (ii) grass not exceeding 50 mm high; (iii) lawn or cultivated garden. (3) However, the firebreak may contain trees if they do not: (a) restrict fire-fighting vehicles being driven along the firebreak; or (b) otherwise pose a direct or indirect danger by fire or other emergency to life or property (Fire and Emergency Act 1996). NTFRS undertake rural property inspections for firebreaks and dangerous fuel loads (according to the Act, land

occupiers/owners must ensure flammable or combustible material does not accumulate on the land in a way that constitutes a danger by fire). If the property is deemed to be not compliant the property owners are given notice and 28 days to respond. If this does not happen then they are issued with an infringement notice.

Fire management is the responsibility of the landowner. BNT undertake firebreak inspections and take along a weed compliance officer to gauge the level of Gamba grass infestation. In 2020, 8,000 tenures were inspected in the Vernon and Arafura Fire management regions. From all these inspections, 200 infringement notices were issued. NT Bushfires can charge people for excess fuel load and take people to court for lighting fires without a permit. From January to October 2020, 1,900 permits were issued.

BNT fire mitigation programs include: aerial burning, working with DPIL Roads to undertake verge burning; identify high risk properties each year; and produce fire management plans (includes weeds). They manage contractors for firebreaks on VCL. Prescribed burning on VCL is undertaken by the volunteer bushfire brigades. NTB inspect the prescribed burns once they have been completed.

BNT try and do early dry burning but this can be difficult when there is a late Wet. They are trying to do more 'cool burning', but there is a window of only about 6 weeks. BNT undertook 164 prescribed burns in the 2020 season aiming to take out circa 30% of the fuel load (BNT, *pers. comm.*, Oct 27th 2020).

8. Organisational accountabilities and community relations

8.1 Council Accountabilities

Council acknowledges that, to meet their statutory and community obligations, the principals of ecological sustainability development (ESD) must be applied across all operations and fostered in the community. They are committed to maintaining or enhancing the health of their natural environment and the well-being and equity of their community for current and future generations. The protection of private rural landholdings for both infrastructure and the environment is vital to the MWF operations.

The Council's operations fall under the framework of the following plans: 2018 - 2022 Strategic Plan, Community Engagement Strategy and Action Plan 2018 - 2021, Litchfield Council Fire Management Plan (2020-2025) and Roads Asset Management Plan.

8.1 Relevant Partner (and Potential Partner) Organisations

LC are aware of their accountabilities and community obligations and manage their weeds accordingly. Their relevant partners and potential partners including government, NGO and the broader community are detailed in Appendix 3.

9. Weed Management Vision, Mission and Goal

9.1 Vision

Resilient healthy land, water and community in the Litchfield Council Municipality.

9.2 Mission

Work with the community to dramatically reduce the infestation of weeds on Council excised land parcels, road reserves, drainage easements and other land.

9.3 Goal

Healthy landscapes with a low perennial local native grass groundcover for improved land, water, wildlife, human health and reduced management inputs.

10. Target weed species

The following target weed species have been derived from legislative obligations and discussion with government and community stakeholders:

- Gamba Grass (*Andropogon gayanus*) – actively manage,
- Neem (*Azadirachta indica*) – actively manage,
- Barleria (*Barleria prionotis*) – actively manage,
- Cabomba (*Cabomba carolina*) – notify WMB
- Calopo (*Calopogium mucunoides*) – actively manage,
- Annual Mission Grass (*Cenchrus pedicellatus*) - actively manage,
- Perennial Mission Grass (*Cenchrus polystachion*) - actively manage,
- Water Hyacinth (*Eichhornia crassipes*) – notify WMB,
- Olive Hymenachne (*Hymenachne amplexicaulis*) - actively manage,
- Thatch Grass (*Hyparrhenia rufa*) – be alert,
- Hyptis (*Mesosphaerum suaveolens*) – actively manage,
- Bellyache Bush (*Jatropha gossypifolia*) – LC is in the A zone needs to be eradicated,
- Mimosa (*Mimosa pigra*) – actively manage,
- Native Passionfruit (*Passiflora foetida*) – actively manage,
- Arrow Head (*Sagittaria platyphylla*) – be alert,
- Candle Bush (*Senna alata*) – spray if in vicinity of Gamba, mission grass etc.,
- Spinyhead Sida (*Sida acuta*) – spray if in vicinity of Gamba, mission grass etc.,
- Flannel Weed (*Sida cordifolia*) – spray if in vicinity of Gamba, mission grass etc.,
- Sicklepod (*Senna obtusifolia*) – spray if in vicinity of Gamba, mission grass etc.,
- Coffee Senna (*Senna occidentalis*) – spray if in vicinity of Gamba, mission grass etc.,
- Paddy's Lucerne (*Sida rhombifolia*) – spray if in vicinity of Gamba, mission grass etc.,
- Snake Weeds (*Stachytarpheta spp.*) – actively manage,
- Grader Grass (*Themeda quadrivalvis*) – actively manage,
- Humidicola - (*Urochloa humidicola*) – consider opportunities of controlling spread and re-vegetate with native species in priority wetlands,
- Para Grass (*Urochloa mutica*) – actively manage,
- Chinee Apple (*Ziziphus mauritiana*) – be alert.

11. Weed Management Strategies

With good weed management strategies in place and clear weed reduction targets for different LC lands, positive weed management outcomes will result and costs for future weed management for those management areas will decrease.

11.1 Broad strategies for weed management

- Conform to obligatory requirements in regard to relevant weed legislation.
- Strategies need to be developed in line with relevant strategic management plans.
- Reduce threatening priority target weed species on Litchfield Council excised land, road reserves and drainage easement.
- Determine and act on priority areas for weed management for focused management actions.
- Use best practice management for target species.
- Develop best practice methodologies for monitoring weed management activities.
- Collaborate with relevant organisations for improved efficiencies and increased area of weed management.
- Work with adjoining land owners to encourage weed management on interface areas.
- Encourage the broader community for better weed management on their respective properties.
- Work toward well managed, healthy habitats that enhance biodiversity, soil health and water quality for the benefit of the community and the wildlife.

11.2 Relevant strategic weed management plans

The following plans provide a guiding framework for the Council to implement best practice weed management. This ranges from legal obligations and broad strategies through to applied best practice management actions for particular relevant weed species.

11.2.1 Broad weed management plans

- Threat Abatement Plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses (2012).
- Darwin Regional Weed Management Plan 2015-2020
- Weed Strategy for NT VCL

11.2.2 Weed management plans for specific species

- Weed Management Plan for Gamba Grass (*Andropogon gayanus*) 2020 - 2030: [Weed Management Plan Gamba Grass 2020-2030](#)
- Weed Management Plan for Grader Grass (*Themeda quadrivalvis*) 2016: [Grader grass weed management plan](#)
- Weed Management Plan for Mimosa (*Mimosa pigra*): [Weed Management Plan for Mimosa](#)
- Weed Management Plan for Bellyache Bush (*Jatropha gossypifolia*) 2018: [Weed Management Plan for Bellyache Bush](#)
- Weed Management Plan for Cabomba (*Cabomba caroliniana*) March 2015: [Cabomba weed management plan](#)
- Weed management plan for Chinee Apple (*Ziziphus mauritiana*) 2015: [Chinee apple management plan](#)

11.2.3 Relevant weed management guides and other management plans

11.2.3.1 NT Wide

- Northern Territory Weed Management Handbook 2018: [Northern Territory Weed Management Handbook](#)

11.2.3.2 Specific weed species

- Gamba Grass (*Andropogon gayanus*): [Gamba Grass Management Guide](#)
- Neem (*Azadirachta indica*) 2015: [Neem management plan](#) (includes management guidelines).
- Barleria (*Barleria prionotis*): [Weed Management Guide - Barleria or porcupine flower \(Barleria prionotis\) \(bangshenghe.com\)](#)
- Annual Mission Grass (*Cenchrus pedicellatus*) and Perennial Mission grass (*Cenchrus polystachion*): <https://www.environment.gov.au/system/files/resources/ff24e078-fbb9-4ebd-855d-db09cb4db1f8/files/five-listed-grasses-tap.pdf>
- Water Hyacinth (*Eichhornia crassipes*): [water-hyacinth-identification-fact-sheet.pdf](#). If found need to inform the WMB.
- Olive Hymenachne (*Hymenachne amplexicaulis*): [Olive hymenachne \(nt.gov.au\)](#) (weed note includes management guidelines).
- Thatch Grass (*Hyparrhenia rufa*): [Thatch-grass-ID-sheet-2017.pdf \(nt.gov.au\)](#) and [Northern Territory Weed Management Handbook](#) (includes management guidelines).
- Hyptis (*Mesosphaerum suaveolens*): [Hyptis-ID-sheet-2017.pdf \(nt.gov.au\)](#) and [Northern Territory Weed Management Handbook](#) (includes management guidelines).

- Bellyache bush (*Jatropha gossypifolia*): [bellyache-bush-management-guide.pdf](#)
- Mimosa (*Mimosa pigra*): [Mimosapigra1.pdf](#)
- Native Passionfruit (*Passiflora foetida*): [Stinking passion flower \(daf.qld.gov.au\)](#) (includes management guidelines).
- Arrow Head (*Sagittaria platyphylla*): [TRNM-Sagittaria-A0 LR.PDF \(nt.gov.au\)](#) (explains process if found).
- Candle Bush (*Senna alata*): [Territory Stories \(nt.gov.au\)](#) (ID fact sheet) and [Northern Territory Weed Management Handbook](#) (includes management guidelines).
- Spinyhead Sida (*Sida acuta*): [Spinyhead-sida-ID-sheet-2017.pdf \(nt.gov.au\)](#) and [Northern Territory Weed Management Handbook](#) (includes management guidelines).
- Flannel Weed (*Sida cordifolia*): [Northern Territory Weed Management Handbook](#) (includes management guidelines).
- Sicklepod (*Senna obtusifolia*): [Sicklepod-ID-sheet-2017.pdf \(nt.gov.au\)](#) and [Northern Territory Weed Management Handbook](#) (includes management guidelines).
- Coffee Senna (*Senna occidentalis*): [Coffee-senna-ID-sheet-2017.pdf \(nt.gov.au\)](#) and [Northern Territory Weed Management Handbook](#) (includes management guidelines).
- Paddy's Lucerne (*Sida rhombifolia*): [Northern Territory Weed Management Handbook](#) (includes management guidelines).
- Snake Weeds (*Stachytarpheta spp.*): [Northern Territory Weed Management Handbook](#) (includes management guidelines).
- Grader Grass (*Themeda quadrivalvis*): [Grader-grass-ID-sheet-2017.pdf \(nt.gov.au\)](#) and [Northern Territory Weed Management Handbook](#) (includes management guidelines) and [What Themeda is that? \(nt.gov.au\)](#) (NT Themeda species ID poster).
- Humidicola - (*Urochloa humidicola*) – no management plan or guidelines for control.
- Para Grass (*Urochloa mutica*): [Para grass \(nt.gov.au\)](#) (includes management guidelines).
- Chinee Apple (*Ziziphus mauritiana*): [chinee-apple-management-guide.pdf](#)

11.3 Setting weed management priorities

11.3.1 Attributes for determining priority management areas

- Degree of infestation of priority target weeds in different LC land parcels

- Location of priority target weed infestation in the landscape, the risk of spread and the potential pathways of spread.
- Protection of high priority natural assets and underpinning flora and fauna.
- Protection of infrastructure on neighbouring properties.
- Safety and environmental threats to neighbouring properties.
- Safety threats to travel corridors.
- Health threats for neighbouring properties and nearby urban centres eg: Palmerston.
- Available resources and potential achievements.
- Incorporate into assessment and mapping of LC excised land parcels, road reserves and drainage easements.

11.3.2 Priority weed management target areas on LC land

11.3.2.1 Clean areas

Any infestations of target weeds on clean areas need to be controlled as a priority. These clean areas are low maintenance, low cost and need to be kept that way. These clean areas tend to become neglected when the focus is more on visible heavily infested areas.

11.3.2.2 Heavily infested areas

Dense stands of Gamba Grass, Mission Grass and other target species along boundaries of rural land that is heavily weed infested need to be managed. Brahmin Road where drains run off, Middle Arm Road, Kentish Road (60-70% managed), the end of Finn Road (Berry Springs end), Connelly Road and parts of Redcliffe Road (more TBC) are examples of heavily infested areas (LC, pers. comm., 27th October 2020). For better control on LC lands the owners of these adjacent properties need to be contacted and made aware of their legal obligations.

11.3.2.3 LC Road Reserves

Infestations of weeds along road corridors have the potential to spread rapidly and act as wicks through the landscape. The strategic goal is to control these weed species by slashing and spraying before seed set to halt any spread.

11.3.2.4 High priority conservation areas

In the LC municipality there are recognised sites of conservation significance, international, national and regional (see Figure 2). There are also species that are endemic to the Litchfield Council municipality.

The Churchers Wetlands has an Australian Government (AG) listed plant species, Trigger Plant (*Stylidium ensatum*) which has been mapped by DEPWS. Other significant conservation areas include the Howard Sand Plains, Agnes Creek/Jenkins Road, all monsoon forests and clean woodlands in the Gunn Point and Weddel (N. Cuff, pers. comm., 27th October 2020). The Howard Springs toadlet is a species endemic to the LC and found in sandsheet country. Typhonium species (Arum Lily) are a genus of conservation significance found in habitats within the LC.

Most of the LC excised land contains wetland, drainage, riparian and sandsheet heath which are all Priority Environmental Management Areas in the Litchfield Subregional Land Use Plan (2016) (See Figure 1).

Humidicola (*Urochloa humidicola*) is a big problem in the wetlands. It out-competes the native grasses, sedges and herbs and becomes a fire hazard once it starts to burn. The dry matter that builds underneath the Humidicola burns like an ‘underground fire’ for a long period of time and is hard to extinguish.

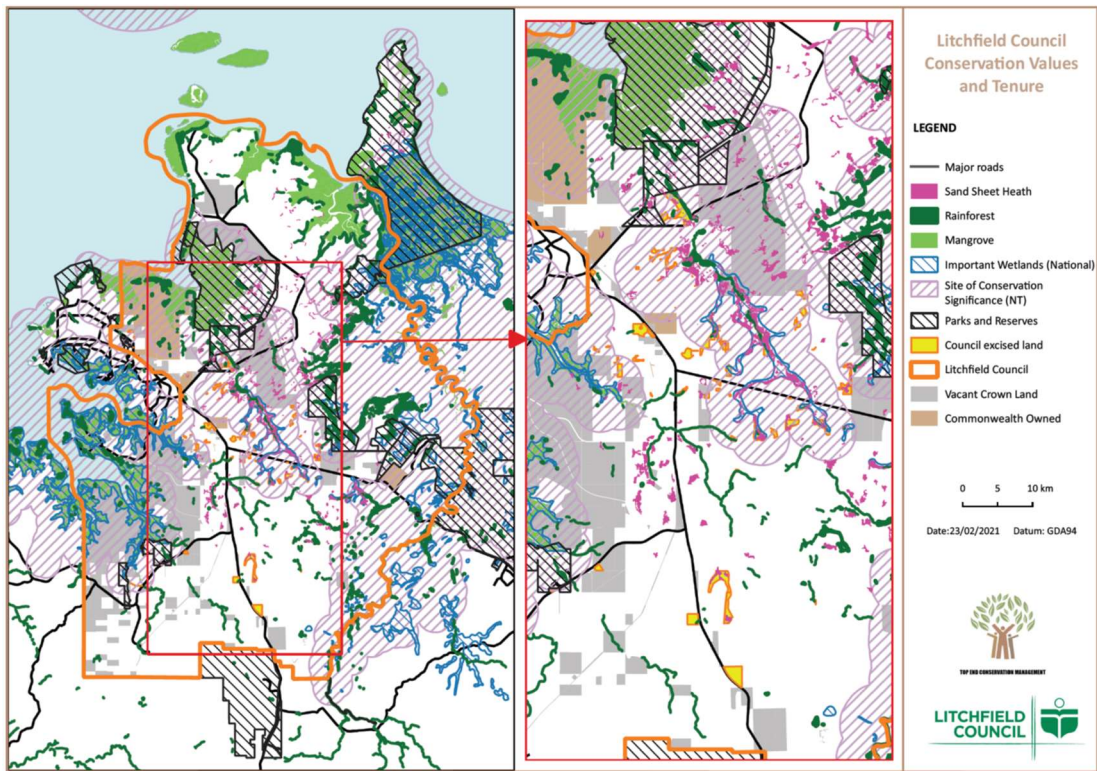


Figure 3 Map showing LC conservation values and land tenure

Sites of Conservation Significance

This title is given only to sites that contribute significantly to nature conservation. Scientists from the Department of Land Resource Management have identified 67 of the most important sites for biodiversity conservation in the Northern Territory. Of the 67 identified sites, 25 are primarily on Aboriginal lands, 24 are primarily on pastoral lands, seven are primarily in national parks, three are primarily near urban areas and the remaining eight sites have a more even mix of tenures (NTG 2021).

12. Weed maps and management actions for LC managed land

12.1 LC Excised land and drainage easements

Please note all these maps have been made available as geo-referenced maps to the Council for use in their weed management. An example weed survey map of an excised land parcel with management actions is provided below. All the other survey maps with management actions are found in Appendix 5.

12.1.1 370 Virginia Road

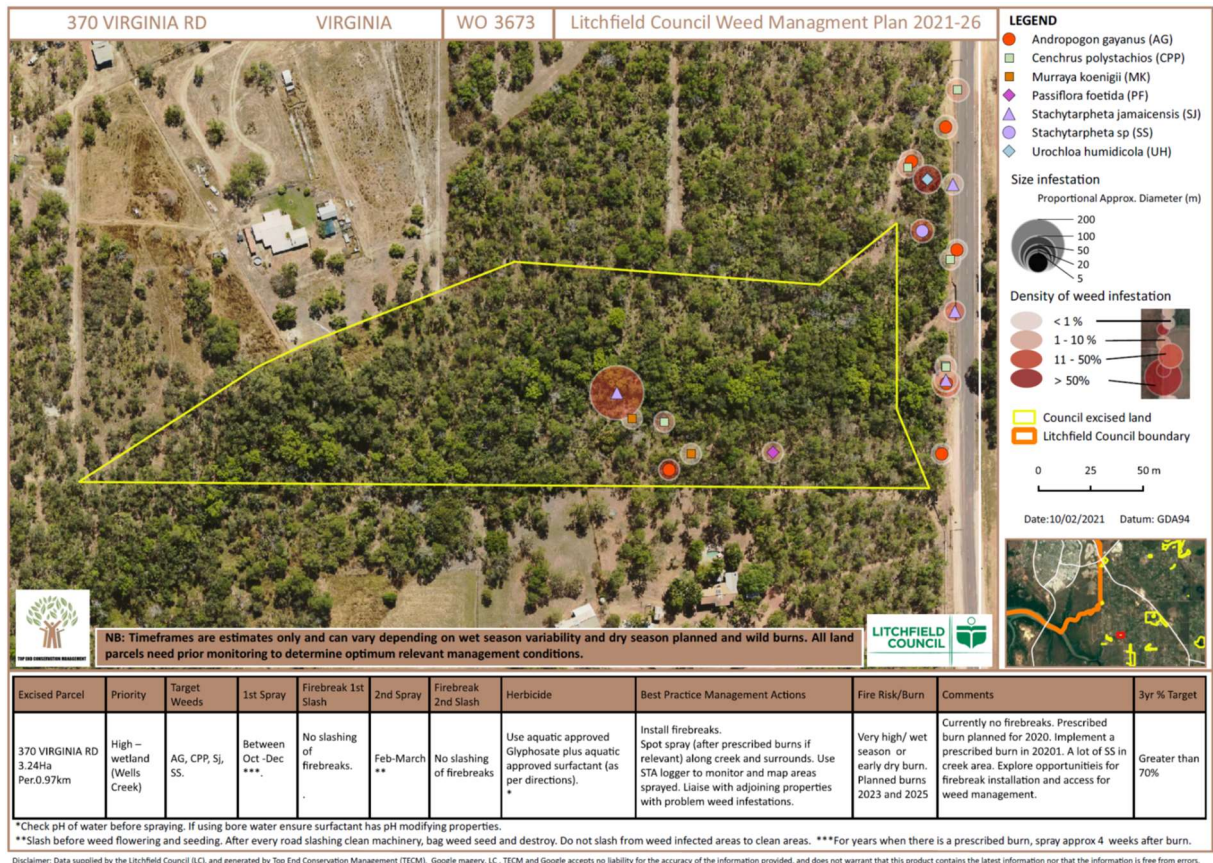


Figure 4 Weed survey map of 370 Virginia Road with management actions

12.2 LC Road reserves

Please note all these maps have been made available as geo-referenced maps to the Council for use in their weed management. An example weed survey map of a road reserve area with management actions is provided below. All the other survey maps with management actions are found in Appendix 6.

12.2.1 McMinns Lagoon

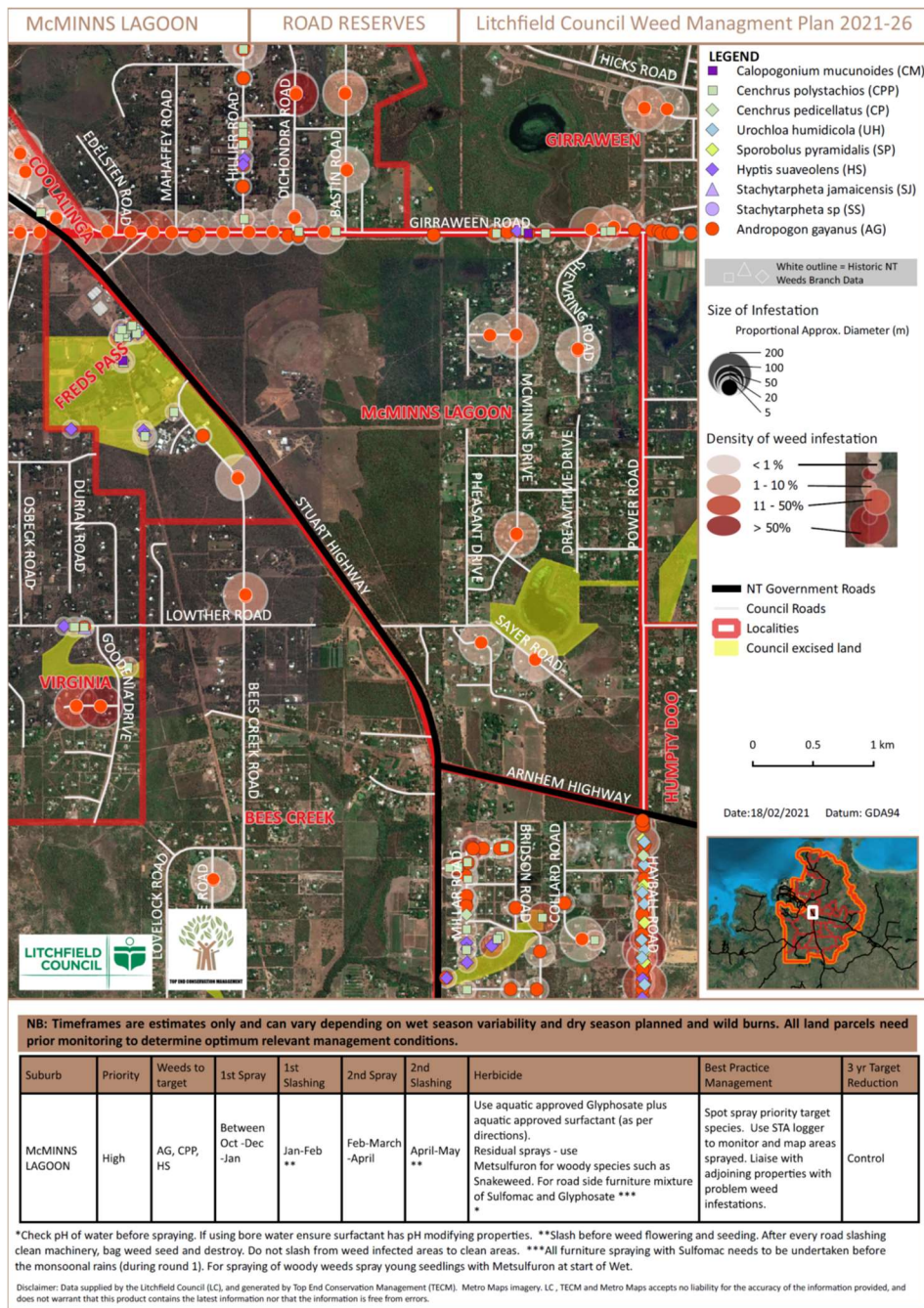


Figure 5 Weed survey map of McMinns Lagoon road reserves with management actions

13. Resources

13.1 Current resources

13.1.2 Staffing

There are five full time positions and 5-6 casual positions.

- 1 x Program leader
- 4 x FTE plant operators
- 5-6 casual plant operators.

13.1.3 Current plant and equipment for weed spraying and grass cutting

- 2 x 4WD Ford Ranger utilities with 500lt spray units and 100m hoses
- 2 x 4WD SSV with 350lt spray units and 50m hoses
- Truck and trailer for SSV vehicle with 3000Lt water pod
- 2 x 100HP tractors with loader buckets and 8ft slashers
- 2 x 110HP tractors with 2m front flail mowers and 8ft slashers
- 1 X 50HP tractor with loader and slasher
- 3 x 4WD front mount mowers 72 inch decks.

13.1.4 Current costs

The current cost for weed management which included 2 rounds of spraying is \$60 per linear km.

This total 2600 linear km comprised of:

800km of road x 2 sides = 1600km.

1000 linear km of excised land and un-formed road reserves

Total cost = \$156,000 (this includes wages, chemicals, service-repairs of vehicles and pumps, fuel, water, registration etc).

13.2 Resourcing required to meet targets

To meet weed management targets outlined in the plan, the following extra resource will be required.

13.2.1 Staff

- 1 x specialist weed management officer employed to be the custodian of the new plan, work with the community on LC/adjointing land interfaces and continually target weed hot spots - \$80,000

13.2.2 Plant and equipment

- 1 x Toyota Hi-Lux 4x4 utility (or equivalent) with (as a minimum) tray back with drop sides and a winch - \$60,000
- 1 x 8 x 4 trailer with drop down tail gate - \$12,000
- 1 x Quickspray Unit with twin hoses and a 400 litre tank - \$18,000
- 1 x Honda 750 quad bike and rear spray unit carrier – circa \$35,000

13.2.3 Training

- Half day weed training workshop - \$2,000 for all staff.

13.2.4 Native grass revegetation trials

- 2 x native grass trials per year @ \$5,000 per trial - \$10,000 per annum for 3 years (sites TBD)

13.3 Available tools for strategic weed management

Department of Environment Parks and Water Security (DEPWS)

- WMB have a Gamba Grass heat map which is available for the LC to use. They can also provide absence data ('extra' data). They also manage the NT Weedmate mobile platform for surveying weeds.
- NR Maps has good Gamba Grass data, patchy records of other species
- Other data sets include the flora and fauna atlas; vegetation mapping (updating) and conservation prioritisation.
- Bushfires NT use 'NearMap' which is updated every fortnight (used for firebreak compliance)

Litchfield Council

- The LC has recently changed its provider for imagery displayed in ArcGIS. The new provider is Metromap which has more accurate imagery.
- The LC now have the full set of geo-referenced weed maps of managed excised land parcels and some of the road reserves. These can be used by the MWF for management and monitoring use.

Charles Darwin University

Charles Darwin University have been trialling WorldView - 3 imagery for detecting Gamba Grass infestations. The WorldView-3 is distinctive in that it captures high resolution imagery with sixteen multispectral bands, as compared to the usual four band satellite range. It detects Gamba Grass with over 90% accuracy during the period of optimum conditions in April/May when there is the largest difference in plant phenology (Rossiter et al 2020). The data acquisition costs (USD) of WorldView-3 imagery were \$0.24/ha and \$0.48/ha for 8-band (lower resolution) and 16-band imagery respectively, (cost based on a >10,000 ha survey) (Shenryk, Y. et al 2020). CDU are now testing the lower resolution (and free) imagery. They are also developing a Gamba Grass website which summarises all their gamba research data (impacts, mapping and management).

Other

- City of Palmerston have created a mobile capture platform for collecting data – LC could explore this option for future weed data capture.
- Fire mapper or Collector are other mobile data collection platforms that can be used for tracking weeds.
- Flow meter on spray units can be linked with the GPS tracker. This records the amount of spray used for the recorded areas. See details on STA logger below.
- GPS tracking is a valuable method to identify gap areas where management has not occurred.

14. Recommended actions

14.1 Strategic planning actions

- Adopt a clear vision, mission and goals and be well versed in the strategic principles behind their operational planning. This all needs to be incorporated into the planned management actions.
- Be fully versed in the relevant legislative requirements in regard to managing target weed species, especially in the light of the recent release of new management plans.
- Be aware of 'weeds to be eradicated' and of A zones for target weeds in NTG Weed Management Plans.
- Apply best practice management to all their operations, ensuring all activities are environmentally sustainable.
- Use available best practice weed management guidelines for all target species (all relevant guidelines listed in this plan).
- Develop and implement a monitoring plan to determine the effectiveness of control strategies.
- Continue regular surveys to improve mapping of key weed species, particularly pasture grass weeds and other poorly mapped species, ranked by infestation severity.
- Keep weed clean areas clean (just as important as reducing weeds in infected areas).
- Aim for clean healthy functioning ecosystems in excised land reserves.
- Explore options to lead a coordinated, cross-tenure weed control program in priority aquatic systems.

14.2 Adoption of tools for management and monitoring

14.2.1 Mobile platforms

- The LC MWF and nominated recorders have registered with NT Weed Mate through the WMB for future weed data recording. Weeds can be recorded and data collated and presented easily through this App.
- The geo-referenced LC excised land and road reserve maps presented in the plan can be used for tracking the surveyed weeds. A set of these maps have been provided to LC. They can be used for both management and monitoring on a mobile platform such as AVENTA that has live tracking capability.
- The STA logger provides automatic location & weed spraying tracking.
- LC need to explore using WorldView – 3 Imagery for future Gamba Grass monitoring.

14.3 On-ground actions

LC needs to consider all the following for best practice management:

14.3.1 Preventative control

- On the 800km of road reserves in the LC there are very few areas clean of weeds but there are transition areas that have infestation densities between those in areas heavily weed infested and ones in lightly infested areas. It is important to manage these areas to prevent further spread of weeds. Control pathways need to be from relatively clean to transition to heavily infested areas. This needs to be undertaken in conjunction with communicating with land owners where the spread is due to unmaintained properties.
- The MWF annual operation plans determine the slashing program in detail. The slashing needs to occur in the direction of clean areas to weed areas. A slashing map with red arrows for the direction of mowing needs to be developed.
- To prevent weed seed spread by the slashers, the seed is blown off and bagged at the end of each road. The seed is kept in plastic bags in a lidded skip bin and is taken to Shoal Bay when full (usually every 6-8 weeks). This practice needs to be diligently adhered to, monitored and recorded.
- Slashers and weed spraying vehicles can also cause further spread of weed species and should be washed down at the LC base on return from weed management activities. The LC should also consider installing wash down facilities in strategic areas throughout the municipality.
- LC should install weed warning signs for their excised land parcels (see below) to alert the community on the dangers of Gamba Grass and other target weeds. It should be aimed at recreational quad bike users, people spraying and the general public etc.



An example of a Gamba Grass weed warning sign used in Queensland for infestations (Rossiter et al 2020).

14.3.2 Best practice spraying

14.3.2.1 Environmentally sustainable weed management

- LC needs to make all attempts to control weeds in the safest and most sustainable way to protect the community and wildlife.
- Weed spraying staff need to participate in a half day weed identification workshop prior to the commencement of each weed control season. This will result in less non-target species being sprayed.
- Ensure the timing and methods of spraying limits off-target effects and efficiently controls target weeds, e.g, it is better to spray in the early wet season when there is ample growth for spraying but limited run off effects due to prolonged rainy days once the monsoon sets in. Where there are low densities of target weeds growing amongst native grasses, wait for the native grasses to drop their seed. This is not always practical. LC could consider changing the management model where more staff are employed for concentrated periods to spray more weeds in the more appropriate times.
- Use the most efficient, environmentally friendly (aquatic approved) herbicide and adjuvant suitable for wetland spraying.
- Use the best 'other' integrated management actions to improve weed control, e.g., prescribed cool burns prior to weed spraying and slashing post spraying. Maybe in some areas it would be better to slash first and then spray when the weeds are vigorously resprouting (often in excised land cases this is not practical due to seasonal conditions. It could be considered in the case of round one of spraying which currently concentrates on furniture and follow up behind slashers for spot spray, however it would require more resources).
- For areas where there is good protection from fire and low infestations of weeds spot spray target species.
- Where possible spot spray weeds after the native grass species have seeded. This allows for the natural regeneration of native grasses to take over the sprayed weed infestations.
- Explore organic herbicide use options which could be used on environmentally sensitive areas such as wetlands. For example it could be used to control Tully Grass in paperbark swamps.
- For landholders adjoining LC land and with infestations of target weed species, LC can liaise and offer support for spraying along boundaries as a minimum.

14.3.2.2 Furniture Spraying

The MWF uses a slightly modified version of the road furniture maintenance guidelines (based on standard best practice guidelines) outlined in the NTG Standard Specification for Road Maintenance 2017. See link [Microsoft Word - StdSpecRoadMaint2017 WITH COVER SIGNED 09Dec2016v2.](#)

The intention is a smaller pattern sprayed allowing efficiencies of slashing plant whilst maintaining vegetation, drain flow and amenity.

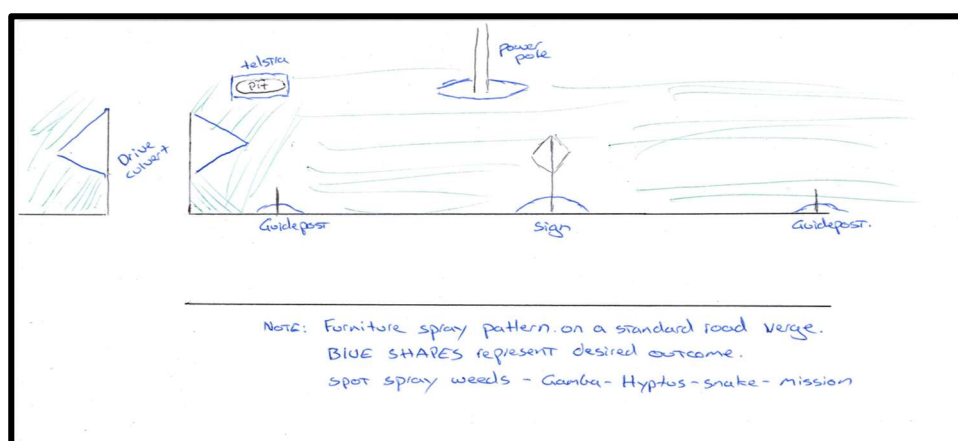


Figure 3 Diagram of LC method of managing weeds for roadside furniture including culverts.

14.3.3 Integration of fire and weed management

Native vegetation management is the broader term used for managing bushland to reduce weeds, reduce fuel load and encourage healthy, sustainable plant communities that are not a threat to human life, property and wildlife. It involves timely weed control via spraying, slashing and mulching and timely prescribed burning that is integrated with the weed control.

For excised land under the jurisdiction of NTB there is a window of about 6 weeks for prescribed burning (NTB, *pers. comm.*, 27th October 2020) but this can vary, especially in the case of a late wet season, which makes access difficult for management. LC needs to keep working closely with NTB so that there is optimum integration of weed and fire management.

Annual burning encourages Gamba Grass and the LC's fire management stipulates prescribed burning every 3 years or so. For areas heavily infested with Gamba Grass it is recommended that one big burn is prescribed to knock down the weed, followed by spot spraying approximately 4 weeks after. The Gamba can be burnt in the early wet when there is green pick in the grassy understorey (providing there has been no fire during the previous dry season).

14.3.4 Encouraging native plant establishment.

14.3.4.1 Road reserve management

For road reserves where there is an abundance of native grasses, allow seed drop before slashing if possible. This will encourage regeneration of more native grasses.

14.3.4.2 Revegetation of native grasses

For problem areas where LC have had to continually blanket spray every year, it is recommended that 6 trial sites be established for revegetation using local native grass species. Native grass seed is expensive and revegetation should be focused on high priority areas. Quick establishing native grasses should be used to outcompete re-establishing weed species. Sites TBC.

14.3.5 Control of weeds where fire is not an option

In areas where there is no burning, weeds need to be sprayed before seed set and then a good firebreak established. After a few years the weeds break down and the resulting mulch layer prevents further weed recruitment and the trees/shrubs increase in cover (Rossiter et al 2020).

14.3.6 Non target native grass species.

There is a suite of native grasses that look similar to some of the target weed species such as Gamba Grass and Mission Grass. It is recommended that the MWF team familiarises themselves with these species to avoid non-target spraying. The MWF should undertake a weed and native species identification training session at the start of each spraying season.

14.3.7 Managing high priority conservation wetlands

- There are opportunities for collaborative strategic weed control in high priority conservation areas where there are different land tenures (See Figure 4). Collaborative strategies and actions can be developed and weeds tackled with more resources at hand.
- LC could work with active landholders to start tackling Humidicola in the Churchers Wetlands area starting at the upstream end and working down the catchment. This would be a good project for Land for Wildlife to become involved too. P&W and CDU might also be interested in providing resources to this very important wetland.

14.4 Partnership development and collaboration

- It is important to identify parcels of land where there are interfaces of LC and VCL land (See Figure 4). At these interfaces there are opportunities to improve weed management on both tenures through cooperation and communication of relevant specific activities by LC and CLE staff. If there is a parcel of treated VCL land adjacent to LC that is being treated as well, CLE are more than happy to provide LC with relevant information to improve both organisations' weed management programs.
- LC have the opportunity to enhance weed management by actively playing a leadership role and organise two planning meetings per annum with CLE, WMB and DPIL – Roads, BNT and NTFRS. One at the end of the Wet to plan prescribed

burning and review weed control and another in November at the start of the weed management season.

- It is recommended that LC and NT Farmers (NTF) meet and work together to address weed management issues where LC land adjoins farmland. There are some problem farms in the LC, particularly where weeds have infested old unmaintained fruit tree orchards. NTF are happy to contact farmers to ensure better collaboration for weed management.
- Continue liaison with the Gamba Grass Army. They will be looking for more focus areas as the program develops. GGA have a network of departments they are working with in the LC municipality including CLE, DPIL-Roads and the Department of Industry, Tourism and Trade (Mining Operations) so it would be good for the LC to continue in this network.
- To date LC have put forward the following focus areas to the GGA: the area around Howard Springs Waste Transfer Station. It has been an issue for quite some time, where surrounding landholders have not been maintaining their land. It is also alongside the bike path therefore not only a weed matter but also a safety issue and highly visible; Duff Road and Thomas Road in cohorts with NTF. NTF are happy to liaise with farmers so that they can work with LC to control weeds along adjoining boundaries and beyond; Churcher Wetlands is the wetland with the highest conservation priority amongst all the LC wetland reserves. There are a few active landholders already working on weed control and are interested in resurrecting the old Churcher Wetlands Reserve Landcare Group; Kristian Billabong (Daniel Circuit) is a beautiful wetland with some hot spot areas of Gamba Grass that could do with some weed control support (it could also be a potential revegetation site).
- Land for Wildlife have over 250 landholders as members, the majority of them in the LC municipality. LFW members have in the past undertaken weed management on common land and could work with the LC on excised land parcels, drainage easements and road reserves.
- Explore the option of allowing CDU to use some of the excised land wetlands as a study/research site for best practice conservation land management.

14.5 Community awareness, engagement and education

- The LC Community Engagement Officer, LC MWF Manager, WMB, TWP and Gamba Grass Roots need to meet and discuss broader community weed management actions in the LC and determine where LC can support.
- Use the LC facebook to inform residents about weed and fire management on LC land and why focus is on particular land parcels eg Sites of Conservation significance. The community can be informed about the good weed management that LC are doing. LC could produce a small *You Tube* video and load it up to the LC Facebook page.
- For community weed management events, the LC Community Engagement Officer can send an invite to all residents of adjoining properties to join in on

group activities to manage weeds etc. around high priority wetlands such as Churchers.

- Schools in the area could adopt a 'patch' of LC land, The kids could go out and undertake activities such as collecting native grass seed for use in revegetation of heavily weed infested areas that require a lot of spraying.
- Adjoining landholders need to be notified when LC will be undertaking spraying on Council owned land.
- Work with Churcher Wetlands Reserve Landcare Group members to support their weed management efforts on that parcel of land.
- Keep abreast of new weed control methods such as biological control programs for Spinyhead Sida (a little green ladybird) and a potential biocontrol for Giant Rats-tail Grass.
- Explore the option of providing local landcare groups who are actively undertaking weed management on LC land with a \$5,000 grant per annum.
- LC have a new resident package that they send out. A weed management awareness and education component should be included in an updated and improved package.
- LC should send an information package to real estate agents to ensure vendors know about legal obligations in regard to weed control on their properties. It would be good for LC to take the initiative here, as a lot of the ongoing weed control on LC land results from weeds that originate from rural blocks.

14.6 Weed management monitoring

It is recommended that LC purchases STA loggers for their weed spraying crews.

- The STA loggers provides automatic location & weed spraying tracking. Once awakened, the STA loggers automatically begin tracking location. The location of trigger presses (i.e. weeds that have been sprayed) are mapped once work commences (no additional input required). This highlights gap areas and is a good record of management activities.
- The STA loggers have hands free data uploading capacity. Once back in the office, the STA loggers can be plugged in to charge the battery where they will automatically search for their home Wi-Fi network and begin uploading the data to the cloud. Overnight, the data is processed and delivered straight back to the LC reporting portal.
- Once the data is uploaded, the operators can log in via a browser or mobile app to view the tracklogs and spray areas from all field units. Visualising the data is as easy as clicking on spray points to view details, turn layers on and off, view graphs on daily spray coverage (m²) as well as exporting maps too.
- The mobile app is GPS enabled meaning field workers can also use this data to continue on from previous day's work, or navigate to historic infestations to follow up and ensure there is no regrowth.

14.7 Use of herbicides and adjuvants

- The use of pesticides and herbicides in Australia is governed by the Agvet Code Act 1994 (Commonwealth) and the Agricultural and Veterinary Chemical (Control of Use) Act (NT). Herbicides must be used according to the directions on the registered label. Users are not absolved from compliance with the directions on the label or conditions of the permit by reason of any statement made or omitted to be made in this publication. For further details see the Australian Pesticides and Veterinary Medicines Authority website at <http://www.apvma.gov.au/index.aspnn> (NTG 2018).
- Where practicable LC need to use aquatic approved glyphosate herbicides and aquatic approved adjuvants (There is generally a lack of registered herbicides for use in natural systems and conservation areas, especially for large infestations).
- When using herbicides. check the water. Generally water coming from Darwin Dam is OK and not an issue, but water used from the bore fields is high in Magnesium and Calcium (and has a higher pH). Need to add a suitable adjuvant that includes a pH adjuster. There are a now next generation adjuvants now available that are a wetter, sticker, pH adjuster etc all in one.
- Always spray according to labels.
- Where practicable use a more environmentally friendly broadleaf spray for weeds such as Hyptis and leave native grasses alone.
- Don't use residual herbicides near wetlands or around farms.
- In Australia and overseas, there are multiple legal cases underway against the manufacturers of Glyphosate over claims that it causes cancer. Currently there is a national discussion on the topic of Glyphosate and it's use. The LC needs to keep abreast of these discussions from a 'duty of care' perspective.

15. Measures of Success for Delivery of Plan

- A monitoring plan needs to be developed and implemented to determine the effectiveness of control strategies.
- Accurate mapping underpins effective weed management. The weed management survey of the major LC excised land parcels, easements and road reserves was undertaken as part of the management plan development and maps produced using the WMB's NT Weed Mate App. Once weeds were surveyed, records were received in Google KML format as well as Excel format. This data was then used to produce the GIS maps of the weed management areas.
- The areas under weed management needs to be surveyed every 3 years to ensure that the best practice management methodologies being applied are achieving the planned Key Performance Indicators (KPI's) which will be linked to the weed reduction targets.
- These best practice management activities need to be recorded (via spray logs and tracking logs) and linked with these KPI's. The degree of success towards the KPI's will be determined by these regular surveys (location, size and density of target weed species).
- In addition KPI's need to be developed for progress towards the broader vision, mission, goals and objectives including measuring against the quadruple bottom line. i.e., social, environmental, financial and cultural.

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