

Weed
Management Plan
2022 - 2025

Contents

Acknowledgement of Country	3
Plan Development & Improvement	3
Executive Summary	4
Gold Coast Campus	5
Zone description and goals	6
Weed control.....	6
Work zones and direction of works	7
Logan Campus	8
Zone description and goals	8
Weed control.....	9
Work zones and direction of works.....	10
Nathan Campus	13
Zone description and goals	13
Weed control.....	14
Weed work zones and direction of works	15
Appendix 1 Guidelines and weed control practices for native vegetation areas	19
Manual and machine-based weed control.....	19

Cover image: Gold Coast Campus (credit: Catherine Pickering)

Acknowledgement of Country

Griffith University acknowledges the people who are the traditional custodians of the lands on which we learn and work and pays respect to the Elders, past and present, and extends that respect to all Aboriginal and Torres Strait Islander peoples.

Griffith University campuses sit on the lands of the Yugarabul, Yuggera, Jagera, Turrbal, Yugambeh and Kombumerri peoples. We acknowledge Aboriginal and Torres Strait Islanders' unique relationship with and understanding and ongoing stewardship of these lands. Through collaboration with staff, students and community members we are committed to embedding Indigenous cultures and diverse knowledge systems in our learning and teaching, research, operations, and partnerships. Griffith acknowledges Elders past and present who guide the way to a more sustainable future for all. Under the guidance of the Griffith University Elders and First Peoples Knowledge Holders Advisory Board we seek to ensure sustainability actions are aligned with First Peoples' knowledges and cultural practices.

Plan Development & Improvement

In developing this plan, Griffith University collaborated with Ecosure, an environmental consultancy as well as input from the University's [Biodiversity Working Group](#) that includes academics from the School of Environment and Science, Campus Life and Griffith Sustainability.

In accordance with Griffith University's commitment to continuous improvement and community engagement, this plan will be reviewed and adjusted taking into account the various views of stakeholders to ensure its relevance, effectiveness, and alignment with evolving needs and priorities. The plan is due to be updated in 2025/26.



An example of weed growth (Ochna) at Nathan Campus

Executive Summary

Effective weed management is a critical component of maintaining and enhancing the ecological integrity of Griffith University campuses. Alien plant species, hereafter called weeds, can threaten native biodiversity, disrupt ecosystem functions, and diminish the aesthetic and environmental value of the forest and campus green spaces. As a place of learning and innovation, the university is committed to fostering a sustainable environment that supports native flora and fauna and provides a healthy, engaging space for students, staff, and visitors.

This Weed Management Plan outlines the strategies and actions we take at Griffith to control and reduce the impact of alien species across the university's campuses natural and landscaped areas.

This plan is underpinned by our [Environmental Sustainability Policy](#), which articulates our commitment to protecting and enhancing biodiversity of our campuses.

Key sections of the plan include:

1. **Key management zones** for each campus, including areas of native vegetation, landscaped gardens, and lawns.
 - Native forest vegetation: The primary goal is to restore and enhance these areas to support biodiversity and ecosystem services in the forests. The areas include endangered, least concern, and of concern Regional Ecosystems (REs), which are vital for conservation.
 - Landscaped gardens: These are planted with Australian native species and support local biodiversity, including over 250 native species in the 9 ha of gardens on the Gold Coast. The goal is to maintain aesthetically pleasing, sustainable gardens that provide habitat for wildlife and promote the use of native plants in South East Queensland.
 - Lawns: Regular mowing will be maintained for function, with some areas to be converted to gardens to reduce costs.
2. **Weed Control:** A structured approach is outlined, consisting of primary weed control (strategic removal), secondary follow-up, and ongoing maintenance. Both physical and chemical controls are recommended, with limited successful biological controls currently available. Methods include manual techniques (e.g., cut, scrape, paint, and spot spraying) to protect native species. The plan emphasizes the need for continuous weed management to prevent re-infestation and support long-term ecosystem recovery.
3. **Work zones and direction of work:** The weed management plan outlines a systematic approach for controlling weeds across the campus by dividing the area into zones. As new areas are worked on, previously treated zones will continue to be maintained to prevent weed regrowth. This approach prioritises zones based on weed types and their impact on forest recovery, ensuring efficient and effective ecological restoration. The process will progress across entire campuses, maintaining treated areas as new zones are addressed. Weed control and restoration efforts will be overseen by experienced personnel, with methods tailored to each zone's ecological needs.

Gold Coast Campus

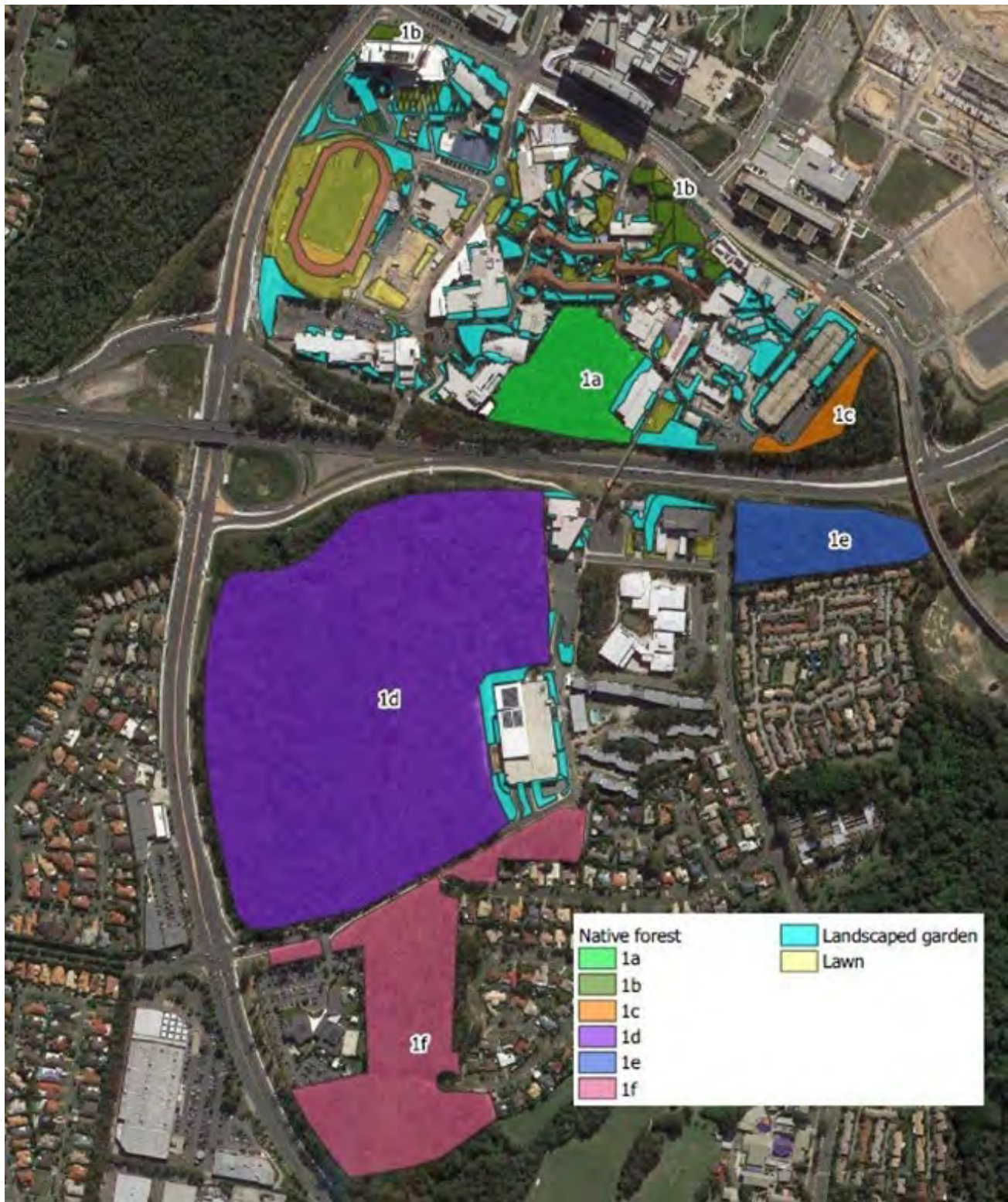


Figure 1 Landscape Management zones at Gold Coast Campus. Landscaped gardens contain native plants.

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Zone description and goals

Three main zones occur across the campus have been identified. They relate to the biodiversity conservation management goals for the campus. They include:

Native Forests (approx. 29.2 ha) – are well established in most areas though some areas are impacted weeds. Native forests in zone 1 have been sub-divided to assist in defining works required and level of management. The goal for zone 1 is to fully recover the native forests to support native flora and fauna and ecosystem services, enhancing the resilience of these high conservation value forests that will be kept by Griffith University. This will be achieved through weed control, effective tree management, the application of the correct fire regimes, pest control and some supplementary planting.

The remnant vegetation within zone 1 contains three mapped Regional Ecosystems (REs), the Endangered 12.11.23 (*Eucalyptus pilularis* open forest on coastal metamorphics and interbedded volcanics), Least Concern 12.3.5 (*Melaleuca quinquenervia* open forest on coastal alluvium) and the Of concern 12.3.11 (*Eucalyptus tereticornis* +/- *Eucalyptus siderophloia*, *Corymbia intermedia* open forest on alluvial plains usually near coast). Remnant vegetation makes up the majority of the area (subzones 1a, 1c, 1d, 1e and 1f, approx. 29.2 ha). The many 1b subzones are the smaller natural areas scattered across the campus. Subzone 1d has been separated based on maintenance requirements.

Landscaped native gardens – garden beds are mostly well established across the campus and contain only Australian native plants, and predominately those from southeast Queensland. They include areas with specific themes/garden styles (e.g. cool food forest, rare and threatened plants, rainforest, architectural, Hamptons, bird, butterfly and bee, coastal roof and wall gardens). The goal for the landscaped gardens is to maintain aesthetically pleasing native plantings that provide a range of ecosystem services including habitat for wildlife, as well as promoting the use of native plants in South East Queensland. The gardens are now major assets at the University with over 250 native plant species, including local Rare and Threatened species.

Lawns – lawns are to be regularly mown to maintain campus aesthetics and services. Selected areas are to be converted to gardens to reduce ongoing operational costs associated with mowing.

Weed control

Weed control should be applied in a systematic and sensitive manner ensuring weeds are replaced with native species rather than by other weeds. It is essential to the recovery process that previously worked areas receive follow up and weed control maintenance, particularly in the native forests.

To assist this process, including ensuring resources are spent efficiently, weed control should be undertaken in the following stages:

- primary weed control
- secondary weed control or follow up
- maintenance of the zone, number of zones and / or site.

Primary weed control

Primary weed control is the initial and strategic control of weed species. Accurate plant identification is paramount to ensure that weeds are targeted, and that native species are not negatively affected. Each weed species or suite of weeds impacting a zone or area is to be assessed to determine how the area will be approached, what techniques will be applied, how certain attributes (e.g. habitat for birds, stability of the slope) can be maintained, and how the area will be maintained.

Primary weed control may involve several techniques and is predominantly manual work using methods such as cut, scrape and paint (CSP) and spot spraying. Primary work will often include the control of woody weeds and vines in the understory as well as the initial spray to control herbaceous weeds, vines or weed seedlings on the ground. Where native species and ground layer weeds occur together, some hand weeding may be necessary to prepare the area for spot spraying.

Secondary weed control (follow up)

On completion of primary weed control, resources vital to plant growth (light, space, moisture and nutrients) are made available to growing plants and soil seed banks. Some treated weeds may re-shoot and a flush of seedlings and groundcovers, both native and exotic, are likely to occur. Identifying regenerating plant species accurately is important to ensure that correct targeted control can be applied. Well-timed follow up weed control by experienced operators is essential to ensuring soil seed banks are

not wasted (e.g. through inappropriate control and off target damage) as this significantly slows the recovery process.

Site maintenance and ongoing weed control

Ongoing weed control and site maintenance are essential to ensure that the site continues to develop, and that exotic species remain at manageable levels. It can take many years of control to exhaust the soil seedbank of weed seed. Furthermore, birds and other fauna, as well as natural disturbance events (e.g. storms, floods, fire etc.) along with dumping of garden waste may assist the continued dispersal of weeds into an area necessitating the need for ongoing management.

The frequency and duration of site maintenance works will vary according to many factors (e.g. capacity of a site to recover, the viability of weed seed within the soil seed banks, weed species impacting the area, the proximity of weed sources for re-infestation, the level of edge to area ratio, the amount of native vegetation filling available gaps etc.). Maintenance and weed control efforts required will decrease over time as the health of an area improves and gaps are filled with native vegetation. Ensuring that weed control maintenance is regular and matches the rates of regrowth, that works are carried out by experienced people in ecological restoration/weed management, and that maintenance is accurate and well timed, will reduce the maintenance efforts (and costs) over time. It is recommended that weeds are controlled through a variety of management approaches utilising both physical and chemical control. To date there appear to be no successful biological controls for the weeds identified on the Gold Coast campus. The application of weed management is determined by the Operations Coordinator, Landscaping.

Work zones and direction of works

Recommendations to facilitate the recovery of the native forests is provided in Table 1. Weeds observed within the Native Forests are listed in the species lists on the Griffith Biodiversity website and on iNaturalist.

Table 1: Zones, descriptions and actions required at Gold Coast Campus

Zone	Description	Action required
1a	2.1 ha Frog Hollow, RE 12.11.23 Singapore daisy; <i>Passiflora</i> spp.	Annual weed control maintenance
1b	These very small areas of natural areas total 0.5 ha and are scattered across the northern section of the campus (north of Smith Street)	Annual weed control maintenance
1c	1.1 ha area of RE 12.11.23 containing multiple weed species including leuceana. This area is also partly managed by the Department of Transport and Main Roads and would require notification of works.	Weed control in conjunction with the Department of Transport and Main Roads
1d	Relatively intact native bushland area containing remnant patches of RE 12.11.23 and 12.3.5/12.3.11. Weed density and diversity varies across the 18.1 ha area, however invasive weeds such as Singapore daisy, lantana, balloon vine, Easter cassia, wild tobacco, cadaghi, yellow bells, Cocos palm, molasses grass, coral berry and giant devil's fig occur within the more intact areas. Weed diversity also increases along the external edges of the zone. Singapore daisy is the most common weed throughout the area and in some places is forming dense carpets, smothering smaller / low growing natives. Several unauthorised tracks along with illegal dumping of rubbish and garden waste are scattered throughout the zone.	Systematic, well timed and regular weed control commencing from the north eastern corner of the zone. Primary and follow up weed control (using a combination of manual control and spot spraying) is required to bring the zone to a level where only maintenance rotations are required. Significant resourcing in the first 2 years followed by Ongoing maintenance over following years
1e	Intact bushland area of RE 12.11.23 and 12.3.5/12.3.11 that is very impacted by dense weeds, particularly through the lower lying sections. Across this 1.9 ha area, weeds such as mile-a-minute, ground asparagus, Singapore daisy, stinking passionfruit, yellow bells, cadaghi, silver-leaf desmodium, butterfly bush, leuceana and many garden escapees are impacting all levels of the native vegetation.	Systematic, well timed and regular weed control commencing from the south eastern corner of the zone. Primary and follow up weed control (using a combination of manual control and spot spraying) will be required to bring the zone to a level where only maintenance rotations are required. Significant resourcing in the first 2 years followed by Ongoing maintenance over following years
1f	This 6.0 ha area of RE12.11.23 is located south of Griffith Way. Weeds such as cadaghi, stinking passionfruit, umbrella tree, Singapore daisy, lantana, Easter cassia, ground asparagus, camphor laurel, mock orange and Cocos palm occur throughout the zone.	Systematic, well timed and regular weed control commencing from the north eastern corner of the zone. Primary and follow up weed control (using a combination of manual control and spot spraying) will be required to bring the zone to a level where only maintenance rotations will be required. Significant resourcing in the first 2 years followed by Ongoing maintenance over following years
2	Landscaped gardens	Some small lawns to be replaced with landscaped gardens including west of G01 and between G06 and G36. Some ongoing planting required including after fishbone fern is controlled and to complement existing landscaping including

Logan Campus

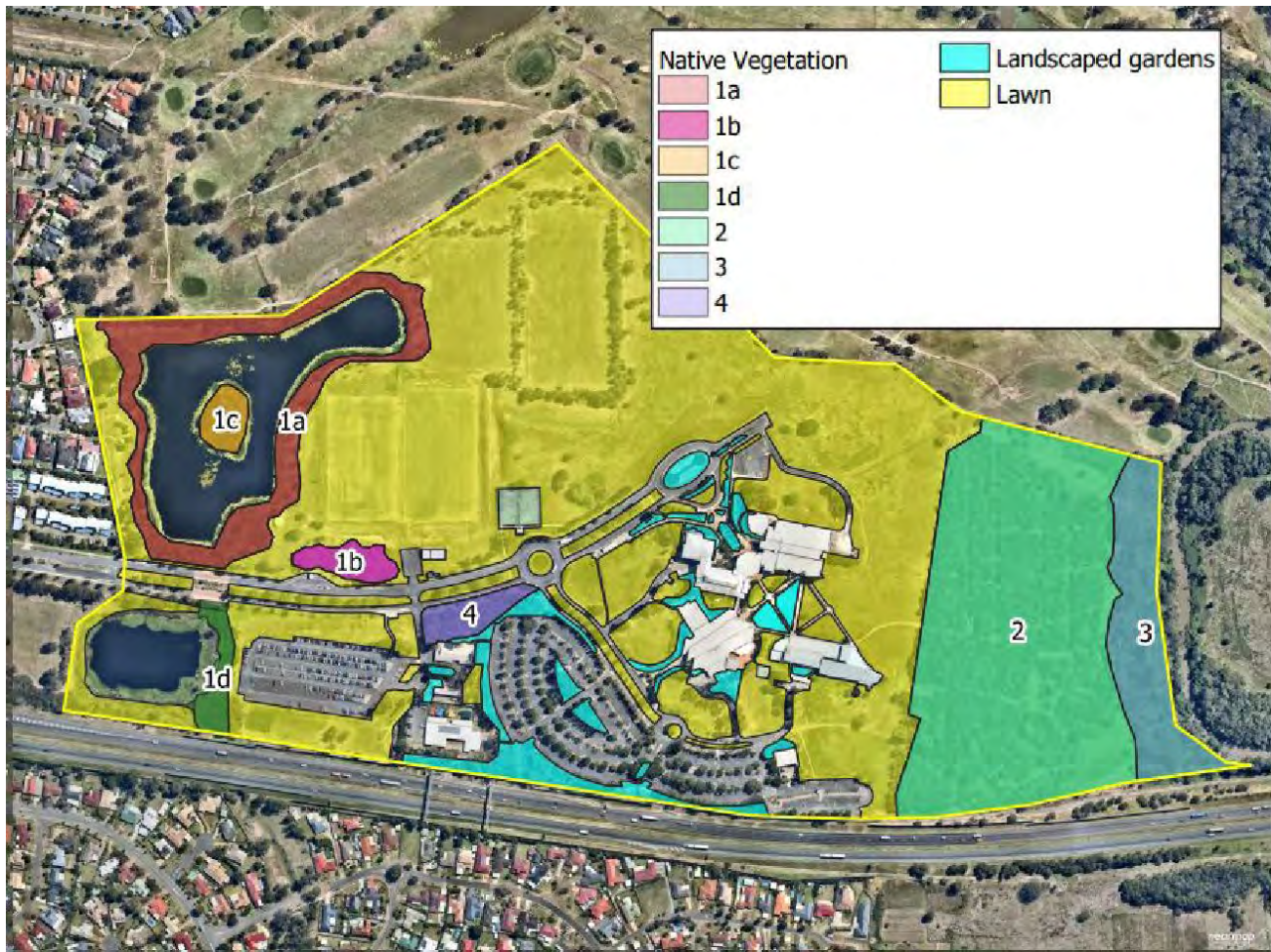


Figure 2 Landscape Management zones at Logan Campus

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Zone description and goals

Three main zones occur across the approx. 55 ha campus including forest, arboretum and other regenerated areas (zones 1, 2, 3 and 4), landscaped areas and gardens (zone G), and grassed areas (zone L) such as playing fields and lawns. They relate to the biodiversity conservation management zones for the campus and include:

Native and Regenerated Vegetation (approx. 12.12 ha), including the areas in and around Lake Ellerslie and the smaller southern lake (zone 1), the arboretum (zone 2), adjacent riparian area of Slacks Creek (zone 3) and some regrowth areas scattered throughout the campus (e.g. between University Drive and Facilities Management (L01)). These zones are mostly established and have important biodiversity, carbon sequestration, urban water-sensitive design and aesthetic values. Most areas contain environmental weeds to varying degrees of impact.

Regenerated vegetation in zone 1 consists of some small plantings around the artificial lake (zone 1a), some regenerated wetland plants such as *Persicaria* sp. and some remaining remnant blue gums (*Eucalyptus tereticornis*) that makeup zone 1b. Native vegetation areas including the area surrounding the lake, the Arboretum and the western side of Slacks Creek have been divided into zones to assist in defining the works required and the level of management. The goal for zone 1 is to enhance the Water Sensitive Urban Design features, improve biodiversity benefits including for birds and aquatic species, while providing increased recreational, aesthetics and experiences for people using the area. This can be completed by a combined approach of weed control and revegetation around existing sections of native vegetation to build on small clumps of trees,

ensuring some space between sections for aesthetics and safety. The goal for the forested areas is to support the ongoing recovery and development of native vegetation, habitat for fauna and ecosystem services. Improved health and diversity of native vegetation in these zones will provide better connectivity for flora and fauna, stabilise the soil profile, sequester carbon, and provide education opportunities and shade for University campus users. This will be achieved through extensive weed and pest control and more active restoration, including some revegetation, particularly in zones 1 and 3. Zone 2 contains an arboretum that provides important educational opportunities and carbon sequestration values. It showcases the native species that would have originally been found on the campus, including important food trees, European timber trees and rare and threatened plants. Zone 3 encompasses the riparian area of Slacks Creek and works in this area aim to increase the health of the original fringing vine forest and Queensland blue gum woodland ecosystems that occur along the creek. Many weeds currently impact the two zones despite previous efforts are currently preventing the recovery of native species.

Landscaped gardens (approx. 1.65 ha) – A number of the garden beds are well established across the campus and use Australian native plants, particularly from the local area. They include areas that highlight the beauty and structure of local trees, as well as a significant and very old *Macadamia* tree in the campus core. The goal for the landscaped gardens is to maintain aesthetically pleasing native plantings that provide a range of ecosystem services including habitat for wildlife. The landscaped areas are also vital for providing shade for students and visitors to the campus and providing a transition between hard landscaped areas, open grassed areas and forests. It is proposed that the style of the gardens be modelled on the North American open campus design but using local native species.

Lawns (approx. 24.36 ha) – Lawns and sporting ovals are all irrigated and are regularly mown to maintain aesthetics and services. Selected areas are to be landscaped to provide shade, more opportunities for native plants and animals, and connect natural areas including the arboretum and Lake Ellerslie with the rest of the campus while maintaining weeds in lawns and within these corridors.

Weed control

Across the Logan campus, some weeds are impacting the forests, lake edges, arboretum and riparian ecosystems. Around Lake Ellerslie, it is mainly exotic grasses and some woody weeds such as lantana, groundsel bush and slash pine. In the Arboretum and adjacent riparian area of Slacks Creek, there are environmental weeds impacting the ability of native plants to germinate, grow, re-shoot and recover, particularly where weeds including exotic grasses are dense. In the gardens, weeds compete for space, water and nutrients reducing aesthetics and other values. Weed control should be applied in a systematic and sensitive manner ensuring weeds are replaced with native species rather than by other weeds. It is essential to the recovery process that previously worked areas receive timely, systematic and accurate follow-up weed control and maintenance, particularly in the natural areas and where nutrient levels are higher.

To assist this process, including ensuring resources are spent efficiently, weed control should be undertaken in the following stages:

- primary weed control
- secondary weed control or follow up
- maintenance of the zone, number of zones and/or site.

Primary weed control

Primary weed control is the initial and strategic control of weed species. Accurate plant identification is paramount to ensure that weeds are targeted and that native species are not negatively affected. Each weed species or suite of weeds impacting a zone or area is to be assessed to determine how the area will be approached, what techniques will be applied, how certain attributes (e.g. habitat for birds, stability of the slope) can be maintained, and how the area will be maintained, particularly in relation to ongoing weed control.

Primary weed control may involve several techniques and is predominantly manual work using methods such as cut, scrape and paint (CSP), manual removal and spot spraying. Primary work will often include the control of woody weeds and vines in the understory, as well as the initial spray to control herbaceous

weeds, vines or weed seedlings on the ground, as is required in zones 2 and 3. Where native species and ground layer weeds occur together, some hand weeding may be necessary to prepare the area for spot spraying.

Secondary weed control (follow-up)

On completion of primary weed control, resources vital to plant growth (light, space, moisture and nutrients) are made available to growing plants and soil seed banks. Some treated weeds may re-shoot and a flush of seedlings and groundcovers, both native and exotic, are likely to occur. Identifying regenerating plant species accurately is important to ensure that correct targeted control can be applied. Well-timed follow-up weed control by experienced operators is essential to ensuring soil seed banks are not wasted (e.g. through inappropriate control of natives and off-target damage) as this significantly slows the recovery process.

Site maintenance and ongoing weed control

Ongoing weed control and site maintenance are essential to ensure that the area or site continues to develop and that exotic species remain at manageable levels. It can take many years of control to exhaust the soil seed bank of weed seed. Furthermore, birds and other fauna, as well as natural disturbance events (e.g. storms, floods, fire etc.) along with the dumping of garden waste may assist the continued dispersal of weeds into an area, necessitating the need for ongoing management.

The frequency and duration of site maintenance works will vary according to many factors (e.g. capacity of a site or area to recover, the viability of native and weed seed within the soil seed banks, weed species impacting the area, the proximity of weed sources for re-infestation, the level of edge to area ratio, the amount of native vegetation filling available gaps etc.). Maintenance and weed control efforts required will decrease over time as the health of an area improves and gaps are filled with native vegetation. Ensuring that weed control maintenance is regular and matches the rates of regrowth, that works are carried out by experienced people in ecological restoration or weed management, and that maintenance is accurate and well-timed, will reduce the maintenance efforts (and costs) over time.

It is recommended that weeds are controlled through a variety of management approaches utilising both physical and chemical control. To date, there are no successful biological controls for the weeds identified on the Logan campus.

Work zones and direction of works

Recommendations to facilitate the recovery of the areas dominated by native vegetation or are more natural are provided in Table 2. Works should be undertaken by experienced personnel / ecological restoration practitioners. Weeds observed within zones 1, 2, 3 and 4 are listed in the species list for the campus on the [Griffith Biodiversity Webpage](#) and on iNaturalist. It is strongly recommended these are followed together with the order of works.

Table 2: Zones, descriptions and actions required at Logan Campus

Zone	Description	Action required and estimated effort
1a	<p>1.96 ha, Pre-clear RE 12.3.11 and 12.3.11 / 12.3.3d</p> <p>Area surrounding Lake Ellerslie dominated by exotic setaria grass, annuals and woody weeds (e.g. lantana, groundsel and slash pine). Also contains occasional planted <i>Melaleuca quinquenervia</i></p>	<p>Control woody weeds such as lantana, groundsel and smaller slash pine by Cut, Scrape and Paint</p> <p>Remove larger slash pine using arborists</p> <p>Control setaria, blue billygoat weed and other herbaceous weeds using a frog friendly chemical treatment and control underneath and directly around clumps of native vegetation or in preparation for planting patches of paperbarks and other suitable species including macrophytes along the water's edge.</p>
1b	<p>0.30 ha, Pre-clear RE 12.3.11</p> <p>Area contains large remnant blue gums with occasional annual weeds underneath. Maintenance is currently via mowing which may negatively impact the health of trees. Some native understorey plants exist.</p>	<p>Continue with ongoing weed control focusing on any germinating annual weeds and known environmental weeds.</p> <p>Consider planting underneath blue gums with native grasses and groundcovers to limit ongoing maintenance over time and improve aesthetics and habitat values while maintaining a safe line of sight.</p>
1c	<p>0.26 ha, Pre-clear RE 12.3.11</p> <p>The island in the middle of Lake Ellerslie is important nesting habitat for water birds as they are protected from predators.</p> <p>It contains a range of weeds and native plants but has not been fully assessed due to challenges with access.</p>	<p>Control smaller woody weeds such as groundsel, lantana and Brazilian pepper tree using cut, scrape and paint</p> <p>Stem inject larger Brazilian pepper tree and leave in-situ as habitat</p> <p>Control herbaceous weeds, exotic grasses and annuals underneath and around native vegetation</p> <p>Ongoing maintenance to be integrated with zone 1a.</p> <p>Additional planting is required to create further opportunities for habitat and improve aesthetics.</p>
2	<p>7.51 ha, Pre-clear RE mostly of 12.11.5 with some 12.3.11 / 12.3.3d</p> <p>This area has been planted in zones which are dissected by a series of pathways to assist access for a range of education purposes. Each section has a slightly different mix of local native plants to highlight different plants within a range of Regional Ecosystems and / or habitat types.</p> <p>Occasional planting and weed control is organised by Slacks Creek Catchment Restoration Group with support / funding from Logan City Council.</p> <p>The ongoing incursion and growth of weeds require control as part of a regular program</p> <p>All areas are impacted by a range of weeds and sensitive weed control will greatly assist the health and development of all planted natives, as well as those that are germinating (or are likely to germinate) in the understorey.</p>	
3	<p>1.73 ha, Pre-clear RE of 12.3.7, 12.3.11 and 12.3.16. A small patch of remnant vegetation of RE 12.3.7 also occurs in the south eastern corner.</p> <p>The zone connects to the developing native vegetation (Arboretum) of zone 2 and when both areas undergo weed control support using current best practice ecological restoration techniques, they will more quickly develop.</p> <p>A large diversity of weeds impacts the zone and still the zone displays some good recovery potential.</p> <p>Many weeds impact the area and are preventing the ongoing growth, health and germination of native plants. The various control techniques and rates of control need to be varied according to the habit of the weed, whether other native plants are present, the stability of the area, the time of year and whether they might be used for habitat and the stage of weed control (i.e. primary, follow up or maintenance). All techniques are further explained in Appendix 2.</p>	<p>Systematic, well timed and regular weed control commencing from the southern remnant patch of the zone and heading north, working between the regenerating edge of zone 2 and Slacks Creek. Primary and follow up weed control (using a combination of weed control techniques including Cut, Scrape and Paint (CSP), manual control and spot spraying are required to facilitate a reduction in weed control efforts over time and support the recovery of native vegetation.</p> <p>Systematically move through the zone controlling woody weeds and exotic vines by CSP. These include weeds such as small- leaved privet, Murraya, ochna, Brazilian pepper tree, devils fig, lantana, corky passionfruit, white passionflower and Brazilian nightshade. At the same time prepare areas for spot spraying by pulling / pushing weeds away from native seedlings and groundcovers.</p> <p>Mile-a-minute is to be cut off native vegetation and the base controlled by CSP or hand pulling (if erosion is not a threat) ensuring cut stems are elevated off the ground to avoid them re- shooting.</p> <p>Spot spray herbaceous weeds and exotic seedlings including Singapore daisy, green panic, Cinderella weed and blue billygoat weed. Leave exotic grasses on the immediate edge of the creek to assist creekbank stability but control small amounts when native plants are present.</p> <p>All works must be carried out by experienced Bush Regenerators to ensure quality work that over time assists site recovery and does not contribute to any erosion.</p>

4	0.35 ha, Pre-clear RE of 12.3.11 / 12.3.3d In good condition with only the occasional weed	Control umbrella tree by Cut, Scrap and Paint (CSP); younger Cocos palm by crowning; and hand pull/spot spray other weeds including climbing nightshade and white passion flower Weed Control Maintenance – to be integrated with other zones. Prune trees along the edge of the area - twice a year
5 Landscaped gardens	Many of the gardens are planted and mainly contain native plants. Some require supplementary planting where plants have died or where spaces need filling.	Refer to the Chart of actions A large camphor laurel remains on campus along Evans Road and requires control and removal. Stems inject and leave in-situ for a few months to ensure full control and then remove using arborists. Additional landscaping is required in a number of areas around the campus to bolster current designs. Areas to be considered for supplementary planting using native plants include between the visitor carpark and the Entrance Court; along Academic Lane; in and around the Central Court (i.e. using more Flindersia spp. And Stenocarpus sinuatus) and along the path between LO8 and the Arboretum. Species selection should be based on native plants that are both aesthetically impressive (e.g. Ficus spp. Flindersia spp. Etc.) using the Logan planting list; are safe (i.e. do not drop big branches in wind which may pose a risk if next to pathways / buildings etc.); are grouped to link with particular themes; and are able to provide habitat and connectivity for local flora and fauna.
6a Sports fields	There are some significant areas of grass and open areas across the campus including playing fields which are all irrigated, as well as other open and mown lawns. The sports ovals require intense treatments and maintenance throughout the year.	At various times throughout the year the sports ovals will require mowing (to a specific height), fertilising, weed control, pest control, irrigation, repairs, wetting agent application, aeration, topdressing, scarifying, turf replacement/renovations, auditing and testing. Refer to Chart of actions and Sport Fields Maintenance plan below for a more detailed plan.
6b Lawns	There are some significant areas of grass and open areas across the campus including playing fields which are all irrigated, as well as other open and mown lawns.	Refer to chart of actions. Much of the work required to maintain lawn and open grassed areas at Logan is slashing and irrigation. There is great scope to landscape some of the open areas and provide better connection throughout the campus as well as additional shade. Landscaping in selected areas will assist creating more flow throughout the campus and connecting buildings and formal areas with the natural areas. This is especially the case with the opportunity to connect the main buildings with the Arboretum. Like the landscaped gardens, species selection should be based on native plants that carry through a similar theme, are aesthetically impressive, are safe and provide habitat and connectivity. Planting is further discussed on p5.

Nathan Campus

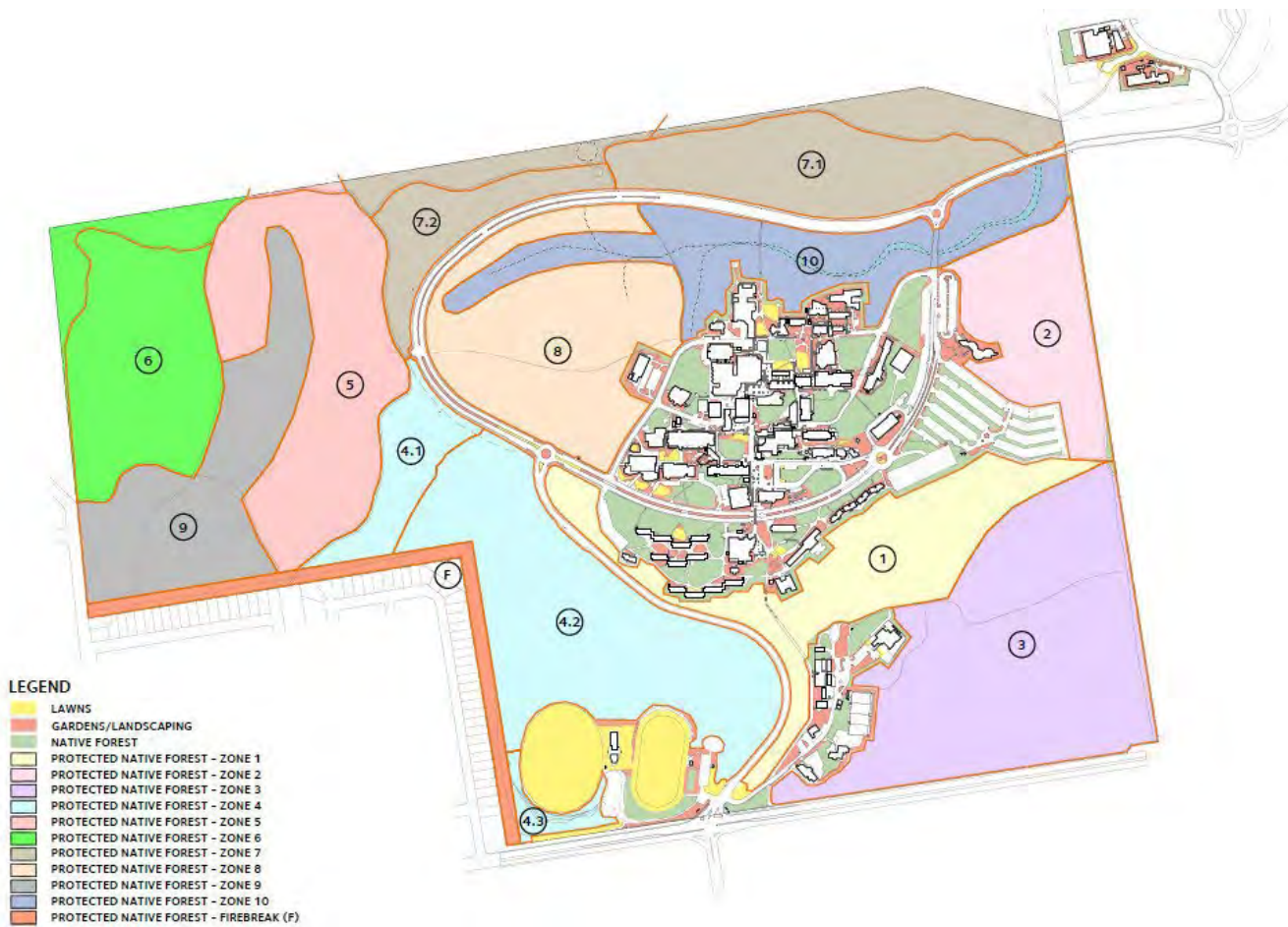


Figure 3 Landscape Management zones at Nathan Campus

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Zone description and goals

Four main zones (Figure 3) across the campus have been identified for management and ecological restoration. They relate to the biodiversity conservation management zones for the campus and include:

Protected Native Forests

The Nathan campus contains approximately 135.9 hectares of remnant native forest that are protected from further clearing due to its ecosystem services, including carbon sequestration, soil conservation, flooding mitigation, temperature regulation, human health and biodiversity benefits among others (See Figure 3). The protected native forests are also used in teaching, research and public engagement, including via the Ecocentre activities, but also by people for nature-based activities (walking, bird watching etc.) and have important cultural significance to First Nations communities. The protected native forest has been divided into 10 main management zones that are further divided to assist in describing priorities and the direction of work (Figure 3). The zone's goal is to control weeds although the extent varies dramatically from very minor to moderate. Weed management actions in this area are focused on enhancing the ecological values of the forest, via continuous active weed control, the use of ecological fire regimes, track management, pest animal management, the removal of rubbish and some supplementary planting/restoration actions.

Fire break access area for management

In one area along the south-western border between the housing and the protected forest where more intensive weed management is required, including maintaining access and keeping the area relatively clear of taller vegetation (zone A on the map). In a few other areas between the protected native forest

and infrastructure/buildings, Asset Protection Zones (APZ) are being identified that may involve Reduced Fuel Zones (FRZ) where some active weed management may be required to reduce understory fuel loads as set out in the Bushfire Management Plan for the campus however, this does not require as open vegetation or clearing of all trees as would occur in zone A on the map. 12 Regional Ecosystems (RE) have been identified on the campus and are listed below in Table 3. Two of the REs, 12.5.3a and 12.9-10.12 are listed as Endangered under the *Vegetation Management Act, 1999*.

Native forests close to buildings

Active management of the areas of native forest within the central part of the campus, so native vegetation can continue to provide a range of ecosystem services including reducing urban heat island effects outdoors, reduced use of air conditioning in buildings via shading, increased health from greenspaces, and habitat for wildlife, research, teaching and learning. These areas are even more important to people on campus as they have higher engagement/visibility and the opportunity to engage with nature as well as other ecosystem services. The management of vegetation near buildings needs to consider factors including maintaining a canopy to reduce temperatures and passive cooling, evaporation, nature engagement, but also address fire risks, weed management and tree health (e.g. risk of branch falls).

Landscaped native gardens

There are smaller areas of more formal style garden beds at the Nathan campus that have been planted with Australian native plants, predominately from South East Queensland and Toohey Forest specifically. These garden beds are generally well maintained, with some small areas with environmental weeds. There are a number of gardens along the fringes of native forests that are close to buildings and pathways that need supplementary planting. The goal of these more actively landscaped gardens is to maintain aesthetically pleasing, well-maintained native gardens that enhance local biodiversity on campus, providing positive mental and physical health benefits and a strong sense of place for people on campus, as well as supporting local biodiversity.

Lawns and playing fields

Lawns on campus must be regularly mown to maintain campus aesthetics and services. Any additional lawn areas are to be discouraged due to the ongoing operational costs associated with the high level of maintenance they require. Playing fields require high maintenance due to their regular use for sporting events.

Weed control

On the Nathan campus, there are some important areas where environmental weeds are impacting the forest. Mickey Mouse bush and corky passionfruit are the most common weeds across the protected forest but are not considered significant environmental weeds. There are also some patches of *Dioscorea bulbifera* (aerial potato) that require control to ensure they do not spread through the wetter ecosystems. Two problem weeds were observed in some forest areas: Cat's claw creeper (*Dolichandra unguis-cati*) and Madeira vine (*Anredera cordifolia*). Due to the highly destructive nature of these weeds, rapid control of these weeds is required to limit further infestation. In a few cases, there were also weeds in the native forest close to buildings and garden beds that needed to be controlled.

The most significant weed areas are mainly concentrated in disturbed areas along the edges of the native forest, including along the borders with neighbouring properties and a few areas around paths and roads. In locations such as along the south-western border, many weeds are spreading from gardens due to garden dumping or planting. Liaising with residents, businesses and organisations adjacent to the university to collaborate on ongoing weed control would be beneficial to limit weeds on campus, and this area will require more intensive management.

Weed control should be applied systematically and sensitively, ensuring weeds are replaced with native species rather than by other weeds. It is essential to the recovery process that previously worked areas receive timely, systematic and accurate follow-up and weed control maintenance, particularly in the native forests. To assist this process, including ensuring resources are spent efficiently, weed control should be undertaken in sections and the following stages:

- Primary weed control
- Secondary weed control or follow-up
- maintenance of the zone, number of zones and/or site.

Details regarding these steps are applied are provided in internal working documents, along with a list of weeds observed on the campus during surveys.

Weed work zones and direction of works

Zones have been designed to assist in providing a guide as to the order of works, including where to start (i.e. zone F), the direction of works and how to build and integrate works as they systematically progress through the site. Current best practice ecological restoration would follow the numerical order designed for a plan however, as Griffith University want to maintain the same numbering of zones as per fire planning, the order of works is to follow the order presented in Appendix 3. For example, start works in zone F and once complete and maintenance has stabilised, commence works in zone 9 while maintaining zone F. Continue to increase the area worked while maintaining and integrating areas previously worked. Priority zones have been chosen based on the types of weeds present, supporting the recovery of the forest, and have been designed in a way that facilitates more efficient and effective work. It is recommended that works commence in Zone F and once primary and follow-up work has been completed across the zone, works are to be expanded into zone 9. Maintenance is then carried out across zones F and 9, while primary weed control commences in zone 6 and progresses while maintaining all previously worked areas. Continue to progress works across the site, always following up on previous works and maintaining areas as primary works continue until the entire site is under maintenance.

Table 3: Zones, descriptions and actions required at Nathan Campus

Zone	Description	Action required
F	<p>Zone F is 3.5 ha and contains RE 12.9-10.4, 12.9-10.26 and 12.9-10.17c. This zone is an average 30 m wide strip of modified bushland act as a firebreak behind houses in the SW corner of the campus, from Kessels Rd to Orange Grove Rd. It has been deemed a priority due to the high density of weeds occurring along this edge as a result of garden dumping, encroachment, edge effects and the presence of cat's claw creeper and Madeira vine in the zone. There are also dense patches of corky passionfruit and Mickey Mouse bush as well as Mother of millions.</p> <p>Works in this section should commence from the SE boundary below the football ovals and follow the edge of the forest before heading northwest, before turning and finishing at the western boundary of Orange Grove Road.</p> <p>The immediate cat's claw creeper and Madeira vine section will require ongoing monitoring and once several maintenance rotations have been carried out, the area will need to be checked every 6 weeks, especially during high growth times to ensure well-timed follow-up weed control can be applied.</p>	<p>The purpose of this zone is to limit the spread of weeds, but also act as an access route, including in case of fires. Activities such as regular slashing, sapling removal and tree pruning work are required in this area (refer to the chart of actions). The vehicular track needs to be well-established and maintained for year-round access.</p> <p>Treatment of cat's claw creeper and Madeira vine is a time-consuming and intensive process requiring significant additional maintenance in the first few years, with less effort required over time if maintenance is consistent. Mother of millions also occurs in this zone, together with many garden escapes.</p> <p>Weed control techniques and rates of control should follow the latest ecological approaches.</p>
9	<p>Zone 9 is a 9.5 ha zone of remnants 12.9-10.4 and 12.9-10.26 and consists of the rest of the bushland area below the Hibbertia track. Corky passion fruit and Mickey Mouse bush are found in some areas in this zone.</p> <p>This zone should be worked from south to north, expanding on the efforts in zone A.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels.</p>
6	<p>The forest to the west of the Wilcox track and north of the Hibbertia Track is zone 6 with remnant RE 12.9-10.4, 12.9-10.17c and 12.9-10.26. This 10.5 ha area of bushland is relatively intact with scattered small patches of corky passionfruit observed on the track edges and minimal weed density through the middle.</p> <p>Weed density is highest on the southern border where it connects with zone 9 and should therefore be worked from south to north.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels, but above current contracted and landscape staff resourcing</p> <p>The existing vehicular track needs to be well-established and maintained for year-round access. The tracks need to be checked to ensure they are free from fallen trees/branches and erosion damage.</p> <p>Weed control techniques and rates of control should follow the latest ecological approaches.</p>
5	<p>A 10.8 ha patch of remnant bushland is situated between the two main bitumen tracks. There are scattered but dense patches of corky passionfruit and Mickey Mouse bush, especially in the southern and northern ends of the zone.</p> <p>Otherwise, this patch of bushland is intact and relatively weed-free. It will hold well once weed control primary and follow-up has been applied.</p> <p>This zone should be worked from south to north, expanding on the efforts in zones A and 9.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels. Additionally, further resourcing will be required post-fire (Hazard Reduction Burn/HRB or unplanned) or after disturbance events.</p> <p>The existing vehicular track needs to be well-established and maintained for year-round access. The tracks need to be checked to ensure they are free from fallen trees/branches and erosion damage.</p>

		Weed control techniques and rates of control should follow latest ecological approaches.
7.2	<p>Zone 7 is a 4.5 ha patch of RE 12.11.24 and 12.11.26. Corky passionfruit heavily impacts this section of bushland on the northern side of the Ring Road.</p> <p>Weed control should continue from 6 into 7.2, with works progressing towards 7.1.</p> <p>At the eastern end of 7.2 is a pond surrounded by eroding dirt tracks. This section would benefit from planting to assist with controlling sediment, improving the water quality, as well as providing habitat and foraging opportunities for wildlife that use the pond. The pond is also observed as a breeding ground for cane toads (pests), which could pose a risk to spread in the surrounding environment and cause significant harm to native fauna and the ecosystem.</p> <p>The native vine <i>Parsonsia straminea</i> is smothering germinating natives and those in the mid-storey around the pond, preventing native plant establishment and growth. We recommend thinning it by cutting smaller vines off and away from natives, leaving the parent vines intact.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels. Maintenance in all previously worked areas needs to continue while carrying out primary and follow-up weed control across this zone.</p> <p>Additional resources will be required for planting. The cost will vary according to the design including space between plants and species selection. It is however suggested that monocotyledons and macrophytes be used around the edges of the pond and be installed close together (e.g. approx. 50 cm to 1 m apart) and offset in a couple of rows to prevent cane toads from entering the water body, breeding and exiting the pond. Maintenance including watering of plants and weed control will be required and will be more intensive in the first 1-3 years until plants are established.</p> <p>The existing vehicular track needs to be well-established and maintained for year-round access. The tracks need to be checked to ensure it is free from fallen trees/branches and erosion damage.</p> <p>Weed control techniques and rates of control should follow latest ecological approaches.</p>
7.1	<p>Located on the northern side of Ring Rd, zone 7.1 is an intact 8.8 ha patch of remnant bushland.</p> <p>Weed density is relatively low in this section, with only scattered corky passionfruit and Mickey Mouse bush. The weed density increases slightly towards the gully that runs through the zone on the far eastern boundary.</p> <p>Zone 7.1 should be broadly worked from west to east to build on the weed control efforts already completed in 7.2 however also working from the road will assist both access and shorter runs to the boundary.</p> <p>The over-representation of <i>Parsonsia straminea</i> needs to be managed. Pruning of the vine needs to occur to allow the germination and growth of native plants in the understorey. Occasional large vines (i.e. the parent vines) are to be retained up larger trees or structures that are able to support their weight.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels.</p> <p>Should a fire occur in this area (wildfire or prescribed burns), follow-up weed control will be required to ensure weeds do not out-compete for native plants post-disturbance.</p> <p>The existing vehicular track needs to be well-established and maintained for year-round access. The tracks need to be checked to ensure they are free from fallen trees/branches and erosion damage.</p> <p>Weed control techniques and rates of control should follow the latest ecological approaches.</p>
4.1	<p>5 ha of bushland consisting primarily of REs 12.11.26, 12.9-10.26 and 12.9-10.17c. In this zone, weed density is highest along the southern and western boundaries of the zone with only scattered weeds observed throughout the rest.</p> <p>Zone 4.1 should be worked systematically from the south to the north. The eastern boundary between 4.2 and 4.1 is a narrow dirt track</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels.</p> <p>Weed control techniques and rates of control should follow the latest ecological approaches.</p>
4.2	<p>Located to the SW of the site, off Griffith Rd, zone 4.2 is a 16 ha area of remnant bushland. The eastern edge of zone 4 is relatively weed-free. The western edge, where it borders zone A is impacted by patches of Mickey Mouse bush, corky passionfruit and some garden escape.</p> <p>Expand on weed control applied in 4.2 by working systematically from the boundaries of zone 4.1 and zone A towards the ovals. Work in strips using the clean edges of previously worked areas as the guide.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels.</p> <p>Pre-defined Asset Protection Zones (APZ) areas need to be clear from excessive fuel loads and fallen timber. Trees need to be checked on an annual basis and pruned regularly to reduce the risk of fire that may result in property damage or issues of safety within the built environment.</p> <p>Weed control techniques and rates of control should follow the details listed in Appendix 3.</p>
4.3	<p>Zone 4.3 is 1 ha on the southwest corner of the campus and predominantly contains the Endangered RE 12.9-10.12 and high-value regrowth vegetation. It has been deemed a priority due to the high density of weeds occurring along this edge as a result of encroachment, edge effects and the presence of cat's claw creeper in the zone. There are also dense patches of corky passionfruit and Mickey Mouse bush.</p> <p>Works in this section should commence from the worked boundary of zone A and initially from the corner of where the football ovals are located.</p> <p>Start by working in strips adjacent to zone A as this is where most weeds occur. Once this has been completed and maintenance has stabilised, consider working strips east to west between zone A and the road, ensuring maintenance works across zone A and this zone has stabilised before increasing the area of primary weed control.</p> <p>Any cat's claw creeper or Madeira vine that is identified must be immediately controlled and regular maintenance applied.</p>	<p>It is essential that maintenance is regularly applied to zone A and that works have stabilised before extending works in this zone.</p> <p>Ensure that any <i>Ochna serrulata</i> is controlled prior to any prescribed burns so this weed can be properly treated. If the fire is introduced, ensure follow-up weed control across the zone or burnt areas are applied in a timely way to ensure native plants are not out-competed by weeds taking advantage of disturbance.</p> <p>Weed control techniques and rates of control should follow latest ecological approaches.</p>

2	<p>Zone 2 is located in the eastern part of the campus and comprises 7 ha of remnant vegetation, RE 12.9-10.26 and 12.5.1g.</p> <p>Zone 2 has been burnt recently and has a very open canopy, possibly due to the intensity of the fire. Despite this, a healthy understory and ground layer are present, with many native species germinating.</p> <p>Weeds are concentrated around the edges of the carparks, buildings, roads and Mimosa Creek. The rest of zone 2 is comparatively weed-free.</p> <p>Zone 2 should therefore be worked from north to south to ensure the denser and more obvious areas are treated first.</p> <p>Native vines are extremely dense between University Road and the Inter Campus Link walkway. They are out of balance due to higher light levels and edge effects and area smothering native plants preventing germination, growth and diversity. We recommend thinning the vines by pruning smaller vines off and away from natives and controlling them along the ground, leaving the parent vines intact to continue flowering and fruiting.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels.</p> <p>Pre-defined Asset Protection Zones (APZ) areas need to be clear from excessive fuel loads and fallen timber. Trees need to be checked on an annual basis and pruned regularly to reduce the risk of fire that may result in property damage or issues of safety within the built environment.</p>
1	<p>Zone 1 is a 11.7 ha patch of remnant vegetation, containing an area of the RE 12.9-10.26 and 12.9- 10.17c.</p> <p>This zone looks to be impacted by the 2021 drought or by fire, with many dead, large canopy trees observed below the Eastern Carpark.</p> <p>Despite this, a healthy understory and ground layer are present, with many native species germinating.</p> <p>Scattered weeds occur throughout most of the zone with a large concentration of weeds behind the multi-storey Ridge Carpark, as well as in the gully behind the college buildings, where there is dense Mickey Mouse bush, corky passionfruit, edible passionfruit, mock orange, broad-leaved pepper tree, Chinese elm, Brazilian cherry, creeping lantana, Cocos palm, cadagi, green panic, ground asparagus and fishbone fern.</p> <p>Behind Carnarvon College, there is a dense patch of Dioscorea bulbifera (aerial yam) that will require treatment during the 6 months it is growing as it dies back for up to 6 months a year.</p> <p>Behind the Child Care Centre and the Multisport Complex are Mickey Mouse bush, corky passion fruit, ground asparagus, Cocos palm, Easter cassia, giant bird of paradise and Singapore daisy.</p> <p>Clean up rubbish behind the Ridge Car Park.</p> <p>This zone should be worked from east to west, as this consolidates the efforts made in zone 2 and ensures works cover the priorities in this area first.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels.</p> <p>Pre-defined Asset Protection Zones (APZ) areas need to be clear from excessive fuel loads and fallen timber. Trees need to be checked on an annual basis and pruned regularly to reduce the risk of fire that may result in property damage or issues of safety within the built environment.</p> <p>The existing vehicular track needs to be well established and maintained for year-round access. The tracks need to be checked to ensure they are free from fallen trees/branches and erosion damage.</p>
3	<p>Zone 3 contains the endangered RE 12.5.3a, narrow patches of 12.9-10.26 and 12.9-10.17c. The zone is 17.6 ha in size.</p> <p>The northern half of zone 3 contains scattered corky passionfruit and Mickey Mouse bush. The southern half is more impacted by weeds, especially within 20 metres of the border with Kessels Road and behind the Multisport Complex.</p> <p>Patches of exotic grasses occur along the Kessels Rd edge, and a densely weedy patch occurs in the SE corner of the zone.</p> <p>The eastern edge of zone 3 is heavily impacted by weeds, including along the fence line with the State Athletics Facility. Guinea grass, corky passion fruit, Mickey Mouse bush and annual weeds are all present. Balloon vine and glycine occur and spread further into bushland as well as covering the fence.</p> <p>Rubbish occurs in bushland along Kessels Rd and requires regular removal due to the open boundary and rubbish dumping.</p> <p>Weed control work in this zone should be carried out from the boundary of zone 1 towards Kessels Rd corner with Queensland Sports and Athletic Centre (QSAC).</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels.</p> <p>The existing vehicular track needs to be well-established and maintained for year-round access. The tracks must be checked to ensure they are free from fallen trees/branches and erosion damage. The track behind N77 needs to be extended to the service behind the childcare area and to act as a firebreak.</p>
10	<p>Zone 10 is a 10 ha section of remnant bushland including Mimosa Creek areas along the North Ring Rd and University Drive.</p> <p>Weeds in this zone were mostly observed behind the university buildings, along the drains that feed into the creek and along Mimosa Creek.</p> <p>Along the North Ring Road, Parsonsia straminea is extremely dense and smothers native plants impacting their ability to germinate, grow, reproduce and provide diverse habitat. We recommend thinning the over-abundant vines by cutting/pruning smaller vines off and away from natives including along the forest floor, leaving the parent vines intact to continue to flower and fruit.</p> <p>This zone is best worked systematically from east to west, towards zone 8.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels, but above current contracted and landscape staff resourcing</p> <p>Pre-defined Asset Protection Zones (APZ) areas need to be clear from excessive fuel loads and fallen timber. Trees need to be checked on an annual basis and pruned regularly to reduce the risk of fire that may result in property damage or issues of safety within the built environment.</p>

8	<p>Contained within Ring Rd, zone 8 is a 11.6 ha patch of remnant bushland. This zone is relatively weed-free, except for scattered weeds along Mimosa Creek, the tracks and behind the buildings/carpark.</p> <p>Along the Ring Road, <i>Parsonsia straminea</i> is extremely dense and is smothering native plants impacting their ability to germinate, grow, reproduce and provide a diversity of habitat. We recommend thinning the over-abundant vines by cutting/pruning smaller vines off and away from natives including along the forest floor, leaving the parent vines intact to continue to flower and fruit, especially where they are able to be supported by larger trees.</p> <p>Works are to progress from the already worked area of zone 10 and head east to west across the zone until it has been systematically covered.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels, but above current contracted and landscape staff resourcing</p> <p>Pre-defined Asset Protection Zones (APZ) areas need to be clear from excessive fuel loads and fallen timber. Trees need to be checked on an annual basis and pruned regularly to reduce the risk of fire that may result in property damage or issues of safety within the built environment.</p>
N	<p>Native forests</p> <p>The native forest areas close to buildings on campus require more maintenance due to their proximity to buildings and a greater interface with people. Some areas are impacted by corky passionfruit vines, asparagus ferns and fishbone ferns. The areas along Mimosa Creek and its tributaries/gullies are also impacted by weeds and vines, close to buildings.</p>	<p>Weed control efforts in years 1 and 2 will be high followed by ongoing maintenance at lower levels as long as maintenance is regular. All primary and follow-up weed control will need to be balanced with ongoing weed control efforts in other zones.</p> <p>Regular tree audits and pruning and selective tree plantings will help to maintain these forest areas while reducing bushfire risk.</p>
G	<p>Landscaped gardens</p> <p>The gardens are relatively weed-free due to the more regular maintenance that is applied throughout this zone. There is however scattered corky passionfruit throughout together with some exotic grasses, fishbone fern and ground asparagus. The trees within the gardens provide refuge to birds and other fauna but need regular pruning and maintenance.</p>	<p>Refer to the Chart of actions and the Nathan Planting Strategy for more details.</p> <p>G – Garden beds</p> <p>The garden beds can be divided further into subzones. G1 – Social areas G2 – Main vehicular and Pedestrian Movement Areas G3 - Ornamental Beds G4 – Building Edges G5 – Modified Sclerophyll Remnants G6 - Water Bodies</p>
L	<p>Lawns and playing fields</p>	<p>Refer to the Chart of actions</p>

Appendix 1 Guidelines and weed control practices for native vegetation areas

To continue to improve the BioCondition score for the areas of native vegetation on Gold Coast and Nathan Campuses, maintaining regular (minimum 6-monthly) weed removal and weed treatment is recommended. This should be primarily concentrated to prescriptive removal along edges of native remnants, with reactive spot management within the core footprint upon closer inspection during maintenance days.

This targeted approach will help to alleviate some of the competition imposed by weed species on native ground-layer species, and in turn help to improve the BioCondition scoring of forb and other ground layer species richness.

If in doubt whether plants are weed or native, confirmation prior to conducting weed removal is required e.g. from Environmental Weed Guide (free from GCCC), Department of Natural Resources Pest Fact Sheets and Common Weeds of Northern NSW Rainforest (The Big Scrub Rainforest Landcare Group, 1998).

Manual and machine-based weed control

The feasibility of manual control methods as a preferred control activity should be assessed against machine-based operations as a secondary preference. While the use of heavy machinery (e.g. dozers, slashers) can result in fast and effective primary weed control, it is in direct opposition to assisted and passive rehabilitation methods and the required extensive propagation, maintenance and monitoring of the ecosystems that comprises this site, post-use. It can also cause degradation of existing native plants of all sizes, compaction of soil, scraping away of topsoil and seed banks, destruction of habitat and damage to root and soil profiles.

Hand removal is recommended where possible and practical except where it may lead to soil destabilisation along creeks and drainage lines. Suitable methods including digging, crowning or hand pulling. All hand removed weed / invasive exotic species should be removed from the site and disposed of at an appropriate Council green waste facility. Where possible, the spread of seeds within the site should be minimised by containing removed exotic vegetation in rubbish bags or other appropriate storage containers. Where hand removal is not possible, general guidelines for use of herbicides is provided below.

General guidelines for herbicide usage

Where herbicide application is required:

- Broad-scale application is not permitted within drainage lines
- Appropriate herbicides are to be used within 30 m of water bodies as it is identified as more “frog friendly” than other herbicides
- Quantities of herbicide need to be controlled and all care be taken to prevent runoff or excess use
- Always read the label to ensure the herbicide is used safely and no certificate is required for use
- Herbicides use should be undertaken during periods of weed growth or as per manufactures specifications
- It is recommended to add spray adjuvant, when possible, to improve adhesion to and penetration of herbicide spray into the target species. Adjuvants should not be allowed to come into contact with natural water bodies when either mixing or spraying herbicide.
- “Inject” infers industry standard treatment for large woody weeds in environmental areas.

Herbicide use is not permitted:

1. during windy periods
2. prior to rain forecast or 6 hours after rain
3. broadly / recklessly in areas where native vegetation dominants

